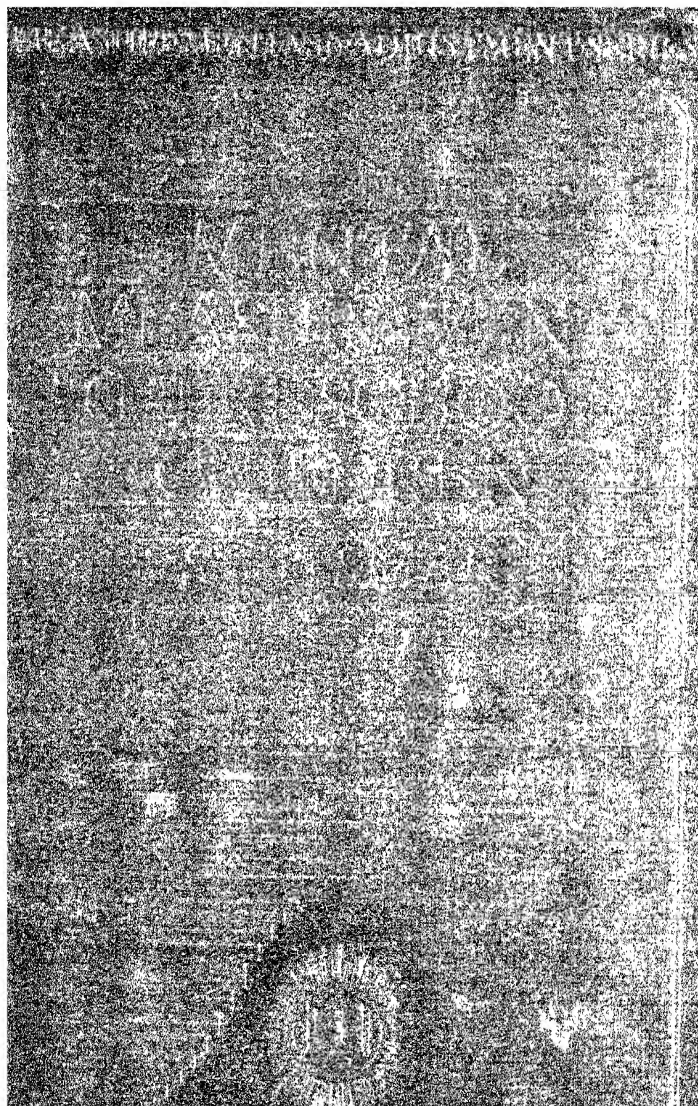


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**MEASUREMENT AND  
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**EDITED BY LEWIS M. TERMAN**

**MENTAL  
MEASUREMENT  
OF PRESCHOOL  
CHILDREN**

**WITH A GUIDE FOR THE ADMINISTRATION  
OF THE MERRILL-PALMER SCALE  
OF MENTAL TESTS**

**BY RACHEL STUTSMAN, Ph.D.**

**Psychologist, Merrill-Palmer School**



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**F**ROM time immemorial breeders of fighting dogs tested even the youngest puppies to find out whether or not they had mettle in them. The puppies were lifted by their tails. Some whimpered; some did not. The whimperers were given away, if any would take them. The others were raised for bull baiting or for the pit. This test was crude, but it took account of innate differences in individuals. At the same time human material was treated as if it were uniform, or it was classified socially — not on a basis of intelligence. Happily the times of this obtuseness with reference to our own species have passed away. Adults, children, and preschool children have been subjected to tests designed to determine qualities, achievements, potentialities. The work with children has been especially valuable, for it helps us to avoid lost motion in trying to bring up individuals in ways that they are not fitted to go. *Mental Measurement of Preschool Children* reviews all that has been done to date in this field, and it contains suggestions for the further advancement of this new subject.

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MANY persons have aided in the formation of this mental-test scale for little children. The work was made possible and was sponsored throughout by the Merrill-Palmer School, where the research was initiated when a mental test for young children was felt to be necessary in the school's program of child-development study: The responses of the Merrill-Palmer nursery school children were the basis for the preliminary selection of the test items, and the Board of Directors and staff of the school have been generous in their assistance.

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RACHEL STUTSMAN

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## EDITOR'S INTRODUCTION

THE value of intelligence tests when they are expertly given and are used with due regard for their admitted limitations is no longer a matter for debate. Whatever the relative contributions of nature and nurture to the subject's present intellectual status, the determination of the present status is of the utmost importance. This is true for children of every age and of every level of ability, for unless we know where the child is in his development there can be no possibility of directing his training intelligently. The problem is especially important, however, in the case of children of preschool age who are exceptional in the direction of either inferiority or superiority. We are coming to recognize that both the medical and the educational treatment of defective or backward children yield far greater returns in the early than in the later years.

The devising of tests for the preschool years offers, however, many difficulties. The choice of material is more limited than for older children, rapport with the subject is less easily established and maintained, testing procedures must be more flexible, and the evaluation of performance is far more difficult. The result is that where we have several good intelligence scales for children of five or six years and older, there are few that have even approached a reasonable standard of satisfactoriness for subjects of three years or younger. The pioneer work of Binet in 1905 was a promising beginning. The later work of Kuhlmann (1922) and of Yerkes and Foster (1923) made considerable advances beyond that of Binet, but it remained for the recent investigations of Gesell, of Goodenough and Kuhlmann, and of the author of the present volume to place the testing of young children on a solid foundation. The "developmental schedules" of Gesell are especially valuable in the qualitative analysis of a child's performances, but it is difficult to secure from them anything very definite in the way of quantitative scores.

The scale here presented by Dr. Stutsman possesses peculiar and outstanding merits which insure for it a wide field of usefulness. The tests have been selected both with psychological insight and with due regard to the practical aspects of the testing situation. Only those have been included in the final series which have proved their worth by the best criteria. The procedures for giving and scoring all the tests have been meticulously defined to insure objectivity and comparability of results. One important feature of the scale is the emphasis given to tests of the performance and other non-verbal types; another is the guide for personal observation of the subject. It is impossible to secure a valid measure of intelligence of young children by merely asking them questions, even when there is no unusual shyness or inhibitory blocking. The mental processes of even the kindergarten child are not very fully verbalized. The young subject must be given things to do which require intelligent adaptation, and besides the formal quantitative score it is highly important to secure observational data of a more general sort on behavior and personality traits that may affect the interpretation of the score.

The preschool period is preëminently the period for individual training. Nursery school and kindergarten children fortunately cannot be welded into platoons and drilled as a unit. Each child at this stage insists on being a separate problem. All this means that teachers of young children, more than teachers at any other level, need to be trained in methods of individual diagnosis of abilities and personality. All, indeed, should have instruction in the administration and interpretation of one or more series of intelligence tests, and every child in the nursery school and kindergarten should be given an individual examination. Dr. Stutsman's book does much to make such a program feasible.

LEWIS M. TERMAN

## **PART ONE**

### **PROBLEMS AND HISTORY OF THE MENTAL TESTING OF PRESCHOOL CHILDREN**



# MENTAL MEASUREMENT OF PRESCHOOL CHILDREN

## CHAPTER ONE

### IMPORTANCE OF MENTAL TESTS FOR PRESCHOOL CHILDREN

It is said that the most effective tool the artist has is his hands, but that the better able he is to combine skill of hand with the use of delicate tools, the finer and the more expressive his art becomes. The most effective tool the child psychologist has is his knowledge of children, subjective though it may be; but this knowledge functions much more freely and effectively when it is supplemented by tools that enable the psychologist to determine a child's level of development. Any device that renders real assistance in this problem of determining the level of development is of value, but the cruder and more inaccurate tools are of much less value than are refined and accurate ones. Standardized tests of all types fall into the classification of useful tools. They enable the clinician to compare the child of whom he is making a special study with a large group of children of the same age. Needless to say, the degree of assistance the clinician obtains from these tests varies directly with the number of children upon whom they have been standardized and the amount of information about the children they make available.

A considerable number of more or less carefully worked-out tests are available for the study of school children, although much still remains to be done in this field. Circumstances make the study of school children fairly simple. The fact that children are all required to attend school for a certain period each day makes it possible for the experimenter to secure his norms from large groups of children.

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He may pick and choose. He may obtain children from all classes of society, all races, and all economic levels. All age groups within the school years are available to him. Superintendents, principals, and teachers willingly coöperate with the psychologist, for they need the benefit of the results of his studies. Year by year the body of information about school children becomes greater in magnitude.

But what of the tests for those too young or too old for enforced school attendance? To get a sampling of these ages is quite another matter. One cannot foist a series of experiments upon the adult without securing his full coöperation. The school child, once grown up, is no longer tolerant of this process of experimentation. At the adult level there is no place where persons of all classes, races, and ages can be collected and studied with comparative ease. Consequently the only adequate sampling of adult development that has been studied as yet is that obtained in the army. This sampling is chiefly of young men not exempted from military service, and therefore not necessarily so representative as one could wish; yet the army tests have done much to show us the necessity of obtaining a complete sampling of the population before drawing sweeping conclusions about mental development. Although the army tests are crude and have many defects, they give us valuable hints about adult intelligence. Certainly we can no longer consider the mind of the college or high school student as a sample of the average adult mind. Such groups as are found in colleges and high schools represent a mental level much above that of the average adult. The army tests have helped us to realize not only this fact, but also the fact that the prison population, another adult group which circumstances place at the disposal of the inquiring psychologist, is not so predominantly inferior as it was formerly believed to be. It is practically impossible, however, to reach many groups of

## *Importance of Tests for Preschool Children* 3

adults under the present social organization. Because of this sampling difficulty, the process of test standardization for adults is far behind that for school children.

It is almost equally difficult to get an adequate sampling of the preschool ages, and such a sampling has become increasingly desirable with the great increase of interest in the study of the preschool child in the last few years. The problem at these ages is to find the child and to get the parent sufficiently interested to permit him to be tested. It is easy enough to make contacts with preschool children through clinics, day nurseries, orphanages, and the like, but there is no assurance that a sampling obtained in this way is at all representative of the whole population of preschool children. As a matter of fact, we are reasonably sure that any single method of sampling we have at our disposal is subject to certain selective errors. No one agency brings together all types of children, and it is certain that there are many types which cannot be reached through any of the more common sources.

However, it is of the utmost importance that we have an ample variety of well-standardized tests for use in the study of preschool children. Every child has a right to an adequate psychological analysis — a taking stock of his assets and liabilities at a sufficiently early age to aid him, as far as possible, to make the most of his life. The more clearly the importance of the preschool years is realized, the greater will be the demand for reliable methods of testing the preschool child.

Many child psychologists have tended to discount the value of tests in diagnosis with young children because of the unreliability of the results obtained. Mateer at one time went so far as to say: "At two an idiot, a moron, and a normal may all seem practically the same. Then the idiot drops out of the race, stays at that level. Somewhere in



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the next four or five years the imbecile falls behind, but the moron may be even ten or eleven before he evidences any real deficiency on our present systems of tests. Yet the difference has been there all along. The moron was as feeble-minded, potentially, at the age of two, as at twelve. The normal child was as surely normal. "There is an innate difference hard to describe, but all who know defective and normal children often recognize this qualitative difference before any quantitative test has demonstrated its presence" (45).<sup>1</sup>

Surely Mateer was justified in making such a criticism of the tests available for the 2-year-old child at the time she wrote. With tests poorly standardized and lacking in interest and variety it is impossible to state whether failure to score at age is due to lack of native ability, to negativism and personality deviations, or to the lack of an environmental opportunity for development.

Yet early diagnosis of general mental defect is of great practical importance. To learn that one's offspring is feeble-minded produces a serious shock at any time, but the shock is less severe if the fact is discovered while the child is still very young. Further, if the mental defect is recognized early, a general educational program can be formulated and the task will not be complicated by unfavorable conditioning and the necessity for the unlearning of bad habits, which are so difficult to overcome in defective children. The possibility of early diagnosis of mental deficiency will also do much to prevent the many tragedies occasioned by foster parents' learning too late that the children they have adopted and learned to love are feeble-minded. The benefit to the child himself of early diagnosis of defect must not be minimized. Serious harm is often done to the child and to other

<sup>1</sup> The italic numbers in parentheses throughout the text refer to items in the Bibliography on pages 353-357.

## *Importance of Tests for Preschool Children* 5

children in the family through failure to recognize the difficulty and to make allowance for it.<sup>1</sup>

To the many children who do not suffer from a general defect but who have some special disability that interferes disastrously with their social and educational adjustments, adequate mental diagnosis means relief from the stigma of mental deficiency and makes possible a readjusting of environment and educational program to fit their special needs.<sup>2</sup>

It is also of great assistance to medical or behavior clinics dealing with children who have special defects to know how much responsibility can be placed on the child in his treatment. The greater the mental ability of the child, the better is the chance of obtaining his coöperation, and the more hopeful is the outlook.<sup>3</sup>

Grave errors in the diagnosis of special defects are common. Deaf children and children with word deafness have been placed in schools for the feeble-minded. Children who have serious reading difficulties are misunderstood and are sometimes even ranked as mentally deficient. All too often a child with visual defects is allowed to drift along in school with faulty perceptions and definite social and educational maladjustments which handicap his chances for success in life and distort his personality. The earlier these special defects are discovered, whether they be physical or mental, the greater is the ease of overcoming them and the more effective is reëducation.<sup>4</sup>

Likewise, superior special ability is more effectively trained and guided if discovered early. It is of importance to the cultural development of society that we discover talent early and prevent the needless waste and loss occasioned by bad train-

<sup>1</sup> See case study of E. S. on page 301.

<sup>2</sup> See case study of J. D. and D. D., page 274.

<sup>3</sup> See page 305, "The Mental Diagnosis as an Aid to Clinics in the Selection of Children for Treatment"

<sup>4</sup> See case study of J. M., page 312.

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ing and misunderstanding. Terman in his studies of superior children has ably pointed out the possibilities of early diagnosis and the necessity for skillful guidance. Many of an individual's life habits are formed before the age of 6 years. The child who has a rapid rate of mental growth is ready for school long before the age of 6, at least as far as his mental level is concerned. It is during this period of waiting until he is legally old enough to enter public school — which is not until the age of 6 in many states — that the excess of energy and the thirst for new experiences make him almost intolerable in the home, and it is during this period that undesirable mental habits and personality trends may become deeply fixed.<sup>1</sup>

Knowledge of the child's level of development is essential to intelligent home training. Many parents are completely at a loss to know what to expect of the young child at different ages. This is particularly true of only children, where there is no other child to use as a means of comparison. There are at least four types of error in home training which result from ignorance of the child's mental level. There is one class of parents who set standards of behavior far too high and difficult for the child to attain. The child's manners must be those of an adult, he must show the same consideration of the cherished home furnishings which his house-proud mother shows, and he is expected to understand and adjust himself to situations far too difficult for one of his years. Frequently the condition is so bad that most of the words the mother addresses to the child are couched in the form of commands. Such a home environment tends to instill a feeling of inferiority in the child or to make him negative and untractable. The analysis of such a case is often difficult because the child seems showered with every advantage and possessed of intelligent, alert parents.

The parents who make too few demands upon the child

<sup>1</sup> See page 342, "The Superior Child."

## *Importance of Tests for Preschool Children* 7

— who regard him as having little or no sense or trainability up to the point where he becomes unmanageable, when they are likely to regard him as abnormal — err in the other direction. Such a lack of understanding on the part of the parents produces a child with an undervolted personality, whose infantile behavior pattern and lack of self-control are likely to persist in adult life and make him a social liability.

A third type of maladjustment is produced by the home where the parents unwarrantably consider the child a genius.<sup>1</sup> Every saying, every act, however commonplace, is to these doting parents a marvel, and the child is openly showered with appreciation and admiration. Such a situation is favorable to the development of the person of egocentric personality, who finds it hard to meet the outside world where such appreciation and personal distinction are rare, and for him unattainable. Children who have some special ability, such as an absolute tone-pitch or an unusual memory, but who are otherwise mediocre, often suffer from this parental error.

A fourth type of maladjustment is caused by the underestimation of the child's intelligence.<sup>2</sup> The sensitive, introverted child is often the object of this error. To the child's detriment, he is unfavorably compared with other, more appealing, more satisfactorily adjusted children. Such a comparison only embeds more deeply his feeling of inferiority. A frequent cause of such a misinterpretation is some outstanding special lack or defect which overshadows the child's otherwise good endowment.

The early diagnosis of the child's level of development by clinical methods offers an opportunity for gaining an objective view of the child as a whole. The diagnosis should be based upon as complete and all-embracing an analysis

<sup>1</sup> See page 328, "Erroneous Impressions of Superiority."

<sup>2</sup> See page 323, "Erroneous Impressions of Inferiority."

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as possible. The physical diagnosis is incomplete without a knowledge of the child's mental level, and vice versa, and the knowledge of his mental level is comparatively useless without a thorough analysis of his personality trends. At present, such an all-round picture is difficult to obtain, but it should be the goal of all who attempt to diagnose the developmental level of the child. Child-research centers and nursery schools are offering an excellent opportunity for the intensive study of the preschool child.

It is only by means of complete and thorough analysis of the young child that we shall be able to evaluate and make practical the many opinions that now fill the literature dealing with the development of young children.

## CHAPTER TWO

### MENTAL TESTS FOR YOUNG CHILDREN EARLIER THAN THE MERRILL-PALMER SCALE

#### AGE-GRADE SCALES

**The Binet scaled tests.** A review of the mental testing movement reveals an astonishing neglect of the preschool child until a fairly recent date. Binet was the earliest experimenter to test preschool children in a definite attempt to obtain standards of development. It is significant that Binet, with his genius, was among the first to recognize the importance of the preschool period in mental development. In his first crude scale of 1905 (9) he introduced several tests for children under 3 years of age. However, apart from the material included in this first scale, Binet published only one report of studies made on infants. His later revisions provide material for only the third year and over. The tests which he introduced for young children have the merit of testing a goodly variety of activities and abilities. The parts of the 1905 Binet scale which apply to preschool children are as follows :

1. Visual coördination.
2. Prehension provoked tactually.
3. Prehension provoked visually.
4. Cognizance of food.
5. Seeking food when a slight difficulty is interposed.
6. Execution of simple orders and the imitation of gestures.
7. Verbal knowledge of objects.
8. Pointing out and finding objects in pictures.
9. Naming objects designated in a picture.
10. Immediate comparison of two lines of different lengths.
11. Reproduction of series of three digits immediately after oral presentation.
12. Comparison of weights : 3 and 12 grams, 6 and 15 grams, 3 and 15 grams.
13. Suggestibility : (a) Response to request for object not

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among the three present. (b) Response to request for absurdly named object not in the picture. (c) Comparison of two lines of equal length.

### 14. Definitions of familiar objects.

Further study and use of these tests enabled Binet to present in 1908 (10) a valuable reorganization of the material, with many new tests added. Unfortunately, the tests for children under 3 years of age were omitted from this scale. The tests were given to 203 children in the public schools of Paris who were selected on the basis of having attained the school grades where they belonged according to their chronological ages. Binet gives a statement of the ages of 192 of these children with the degree of advancement and retardation found. The tests of the 1908 scale were organized as follows:

#### *Age 3 years*

1. Points to nose, eyes, mouth.
2. Repeats sentences of six syllables.
3. Repeats two digits.
4. Enumerates objects in a picture.
5. Gives family name.

#### *Age 4 years*

1. Knows sex.
2. Names familiar objects.
3. Repeats three digits.
4. Makes comparison of two lines.

#### *Age 5 years*

1. Makes comparison of weights: 3 and 12 grams, 6 and 15 grams.
2. Copies a square (using pen and ink).
3. Constructs a rectangle from two pieces of cardboard, having a model to look at.
4. Counts four pennies.

In his book *Les Idées modernes sur les enfants*, published in 1909 (8), Binet gives a statement of a complete scale.

It is slightly different from any of the other scales and includes the following tests :

*Age 3 months*

Shows visual coördination.

*Age 9 months*

Attends to a sound of an object behind head or out of the field of vision.

Seizes an object after contact with it or after visual perception of it.

*Age 1 year*

Recognizes foods.

*Age 2 years*

Walks without aid.

Executes a simple commission, as, "Go and find a ball."

Indicates own natural needs.

In the 1911 revision the tests for children under 5 years of age are reproduced unaltered from the 1908 scale.

Most of the scaled tests applicable to the preschool child have been revisions and modifications of these original Binet tests. All the American revisions have been a combination of the various Binet scales, sometimes with additions and alterations. In order to be able to apply these tests, standardized on French children, to American children, it was necessary to revise the translated tests and to restandardize them on American children.

There have been translations and revisions of the Binet tests in many languages. Scales have been worked out for deaf and blind children. Everywhere the test has been found to be efficient and useful.

**Goddard revision of the Binet tests.** Goddard published English translations of the Binet scales in 1908 (24) and 1910 (25), and in 1911 (26) the first American revision of the Binet tests. No tests for children under 3 were included



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in this scale, and the tests at the 3- and 4-year levels were adopted unchanged from the Binet 1908 scale. At the 5-year level a new test, "Repeats sentence of ten syllables," was added. No children as young as 3 years of age were tested, and only eight children 4 years old were included. The 5-year group was well represented with 114 children.

**Kuhlmann-Binet scale, early revisions.** In 1911 Kuhlmann published a brief and slightly modified translation of the Binet 1908 scale (39), and in 1912 his first American revision of the scale (40). The data used in the organization of this scale were obtained chiefly from feeble-minded children, a much less satisfactory source than normal children, especially if the scaled test is to be used for normal children. No one realized this defect of his scale better than did Kuhlmann. He continued his experimentation and collection of data, and in 1922 published a much more carefully scaled Binet revision, which will be considered later.

**Yerkes-Bridges-Hardwick point scale.** In 1915 a point scale using the Binet tests was published jointly by Yerkes, Bridges, and Hardwick (79). The idea for this scale was developed from the work done by Huey. The writers felt that the Binet scale in its early forms did not offer fine enough distinctions in ability. They felt that the exact degree of success should be evaluated to account for the child whose performance was somewhere between complete failure and complete success. Such a plan would provide for variations within any one age group and avoid the necessity of dropping into the next lower age group a child whose performance was short of perfect. Consequently, a new scale with twenty tests was formed and credit was given in points for each item passed in each test; for example, one point was given for each sentence repeated or for each word defined. The majority of tests in this scale were adapted from Binet. Eight hundred five children were used in the calculation

of norms. Of these, 729 were children in public schools and kindergartens, and only twenty were under 5 years of age. These twenty children were all 4 years old and were taken from two schools attended by children of different social levels. The norms for these two schools were not combined, but they were compared. Such a dearth of numbers in standardization renders the scale of little value with preschool children.

**The Stanford revision of the Binet-Simon tests.** Terman became interested in the possibilities of the Binet tests soon after they first appeared. In 1912 Terman and Childs published a tentative revision of the Binet-Simon scale, based on 396 California public school children (64). These results included a few children under 5 years of age.

This was only a beginning. In the fall of 1913 Terman began a thorough revision of the Binet tests (65). To the original Binet tests he added thirty-six tests from other sources. Greater care was taken in the standardization of the tests than in previous studies. Much attention was given to uniformity of procedure. The examiners were carefully trained before they were sent out to test. The children's responses were recorded verbatim, and they were all scored by the same person. All children were tested within two months of a birthday. They were from a school in a community of average social status, and no foreign-born children were included. One thousand school children were studied. The age scale extends to 3 years, but only ten children of 3 years of age were tested and fifty-one children at 4 years of age. In view of these facts, it is not surprising that the intelligence quotient obtained from these standards is as instable as it usually is found to be with young children. The test is well organized and easily administered. Terman's farsighted method of giving detailed description of test procedure has done much to make for

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uniformity in test administration (63). In spite of the inadequacies of standardization, this revision is one of the most satisfactory and most widely used of the Binet tests.<sup>1</sup>

**The 1922 Kuhlmann revision and extension of the Binet scale.** After seven years of experimentation with tests and their standardization, Kuhlmann published in 1922 an extended revision of the Binet tests (41). This revision claims to correct the tendency of the earlier scales to overrate the ability of younger children and to underrate that of older children. Nineteen of the original Binet tests are omitted, thirty-seven of the original tests are retained, and seventy-three new tests are added. The Kuhlmann scale extends down to 3 months and includes five groups of five tests each for each age level under 3, and eight tests for each age level over 3 up to 13 to 15 years. More than two thousand normal children were included in the standardization, but the preschool ages are not nearly so well represented as the school ages. The younger normal children were obtained chiefly from "baby contests," an orphanage, and from public school kindergartens. The results of the tests for the preschool ages, according to Kuhlmann's analysis, are not so accurate as for the older children, and an inspection of his results confirms this conclusion. Table 1 shows the number of children used in the standardization for the age groups under 5 and the average mental age and intelligence quotient for each of these ages.

An inadequate number of children was used in some ages, and the mean mental age and intelligence quotient are strikingly higher than they should be in most of these age groups. Kuhlmann explains this distortion as due to an allowance made because the "baby contest" children were above

<sup>1</sup>The New Stanford Revision in process of standardization at date of this writing will afford two complete scales, each extended to measure intelligence as low as the 24-month level.

TABLE 1

DISTRIBUTION OF CASES IN THE KUHLMANN REVISION OF THE BINET TEST FOR AGES 3 MONTHS TO 5 YEARS, GIVING THE AVERAGE MENTAL AGE AND INTELLIGENCE QUOTIENT FOR EACH AGE.

AGE GROUP	NUMBER OF CHILDREN	AVERAGE MA	AVERAGE IQ
3 months	20	2.85 months	0.95
6 months	46	7.08 months	1.18
12 months	83	13.80 months	1.15
18 months	98	20.16 months	1.12
2 years	71	2.16 years	1.08
3 years	{ 45 (5 tests) <sup>1</sup> { 8-10 (3 tests) { 12 (4 tests) { 39-41 (3 tests) { Terman's norms { (1 test)	3.18 years	1.06
4 years	{ 39-41 (3 tests) { Terman's norms { (1 test)	4.26 years	1.07

<sup>1</sup> Of the eight tests of the series, five were given to forty-five children, of the other three, one was given to eight children, one to nine children, and one to ten children.

average; but he does not explain how he was able to determine that they were above average or what method he used in correcting this error.

The tests are presented with enough descriptive data to enable the examiner to be hopeful but not quite sure that he is administering them correctly. The tests offer considerable variety at most age levels, but are somewhat restricted at the 18-month level. At this level three of the five tests are concerned with food. These tests are unpractical because of the type of material required and because of the tendency of many children of that age to show conditioned responses to food, which would invalidate the test results. The scoring of too many of the tests for infants is based upon reports of parents and nurses, who are untrained observers and are therefore likely to make inaccurate reports.

Moreover, in this 1922 revision several of the test pictures and figures have suffered rather alarmingly at the hands of

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the reproducing artist. There is a consequent increase in difficulty over the earlier revisions with a resultant change in the age levels for which the tests are adapted. Also the number of separate blanks and sheets to be used seems unnecessarily to complicate the administration of the test. On the other hand there are some decided improvements over the early revisions in the material to be used with little children. New and attractive pictures and other objective material undoubtedly add to the ease of administration and the maintenance of interest with the preschool child. Several new tests for the young child are introduced which seem to be very good. In spite of its defects Kuhlmann's 1922 revision of the Binet scale is one of the best tests now used for preschool children.

**Burt's English revision of the Binet scale.** In 1921 Cyril Burt published the first revision of the Binet scale adapted to English children (14). Burt introduced no new tests. His work is strictly a revision of the original Binet tests. The tests are very carefully evaluated and set a new standard for the scaling of tests. They begin at the 3-year age level and extend up to 16 years. The organization of the test makes it applicable to children 2 years of age and older. Over thirty-five hundred children were tested in revising the norms: 2674 were normal children from the elementary schools in London, 729 were attending special schools for the mentally deficient, and 107 were juvenile delinquents. Unfortunately for purposes of comparison, Burt gives no statement of the number of children tested at each age level. The general excellence of his statistical analysis leads one to have faith that he has avoided the common error of having too small a number of cases in the lower age groups. It is to be regretted that it was necessary for Burt to retain, in the interests of preserving the character of the original, the crude and dismal pictures introduced by Binet.

**Herring revision of the Binet-Simon tests.** In 1922 Herring published a revision of the Binet tests (30, 31) which has the merits of compactness of material, ease in administration, and the possibility of securing either a longer and slightly more reliable test or a shorter and less fatiguing test. Herring also introduced interesting tests to supplement the older Binet material. Most of the earlier tests used are greatly changed and are attractively adapted to present-day situations. New pictures are used which not only have interest and meaning to the child but are also pleasingly executed. However, the scale gives mental ages very little below 5 years. Though Herring does not state how many 4-year-old children he tested, the number must have been inconsiderable, for his figures show that the number of children under 3 and over 13 years of age studied for his preliminary norms totals only twenty-eight. Although this revision has many admirable improvements over previous scales, it is of little value in its present form for studying the preschool child.

**The Mentimeter Tests by Trabue and Stockbridge.** Mention should be made of the "List of Typical Performances" for infants given by Trabue and Stockbridge in their series of Mentimeter Tests published in 1922 (70). This list consists of tests for children from 3 months to 4 years of age, inclusive. The tests for children under 3 are modifications of those suggested by Kuhlmann, and those for 3- and 4-year-old children are taken from the Stanford revision of the Binet tests. The authors combine the two separately standardized groups of tests without further standardization or justification.

**Yerkes-Foster point scale for infants.** In 1923 a revision of the Yerkes-Bridges point scale was published (80). This revision presents, in addition to the original pre-adolescent point scale, a suggested infant point scale worked out by

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Dr. Josephine Curtis Foster. Dr. Foster began the work in 1917 but left the scale only partly standardized in 1919. The results were not published until 1923. The majority of children tested were in public schools in Cambridge, Massachusetts. Other children were obtained from day nurseries, settlement houses, and a large children's hospital. Although the authors call this a suggested and only partially standardized scale, the number of cases of children of pre-school age is larger than in almost any other standardization of the Binet tests. The children are classified by half-year instead of year intervals. The age frequencies under 5 years were as follows:

AGE GROUP (Years)	NUMBER OF CHILDREN
3.0 to 3.4 . . . . .	7
3.5 to 3.9 . . . . .	15
4.0 to 4.4 . . . . .	44
4.5 to 4.9 . . . . .	83
Total . . . . .	149

Suggested norms are given for children from 3 to 7 years of age. Only a brief discussion of the selection and weighting of the tests and the process of standardization is given.

The tests themselves are chiefly modifications of the pre-adolescent scale or are taken from the various Binet revisions. The easier Porteus Mazes up through the eighth year are included as one of the tests, with a modified method of scoring. New tests introduced are color patterns, drawings from memory, and memory for pictures. There is a brief description of the method of giving these tests to help the examiner in their administration. The scale has variety of tests and simplicity of organization in its favor.

**Town's Mass Mental Test for young children.** The first attempt to apply the Binet tests to group testing was made by Town in 1919-1920 (69), when she was confronted with the necessity of testing large numbers of kindergarten

and first-grade children. This test was not published until 1922. Town has modified the type of the tests very little, but has ingeniously altered the organization of the material to meet the needs of group testing. Only thirteen tests are used, as follows :

1. Discrimination of color.
2. Pointing to parts of the body.
3. Pointing out objects in pictures.
4. Judgment of length.
5. Discrimination of sex.
6. Counting four.
7. Counting thirteen.
8. Discrimination of form.
9. Æsthetic comparison.
10. Judgment of similarity.
11. Picture completion.
12. Copying a square.
13. Copying a diamond.

The tests are organized in a compact booklet. The drawings are superior to those used by Binet, and considerable improvement is shown in the attractiveness of some of the tests. This group test can be given quickly and is doubtless valuable in selecting children who need more intensive individual examination than the group test provides. It suffers from the usual defects of group tests for young children. The variety of tests is necessarily limited; so one must get at the child's ability always through the medium of pictures and by the method of checking. If the child tested happens to be inferior in the skill of getting meaning from pictures (as would happen in the case of a child with a visual defect) or if he is slow in getting the checking idea, he fails on the whole test series.

Town has standardized this test well from the point of view of numbers, but the norms are given in terms of grades — 581 children in kindergarten and 1637 children in the



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first grade — rather than of chronological age. Apparently no children under 5 years were tested unless they were in kindergarten. The tests are simple enough and have sufficient interest to warrant their use with 3- and 4-year-old children.

### OTHER AGE-GRADE SCALES

**Porteus Maze Tests.** The Porteus test series is the first, aside from the Binet group, to include the preschool child. This test series consists of two tests of motor coördination and steadiness in the use of the pencil — tracing a diamond for 3-year-old children and tracing a cross for 4-year-old children. After this age the character of the tests changes to the solution of mazes of increasing grades of complexity. The test series is scaled, and mental ages are assigned on the basis of final achievement. These tests first appeared in 1915 as tests for the feeble-minded but were revised and published as tests for normal children in 1919 (52).

**Kohs' Block Design Tests.** The Kohs series of block design tests, published in 1923 (38), represents a study of children from age 2 years 7 months to adulthood (37). The test is not adequately standardized below  $5\frac{1}{2}$  years. The distribution of cases under this age is as follows:

AGE GROUP (Years and Months)	NUMBER OF CHILDREN
2-7 to 3-6 . . . . .	3
3-7 to 4-6 . . . . .	7
4-7 to 5-6 . . . . .	14
Total . . . . .	<u>24</u>

Because of the small number of young children tested, and probably also because of the difficulty of the tests for young children, mental-age equivalents are not given below 5 years 3 months of age.

**Detroit Kindergarten Test.** The Detroit Kindergarten Test (3), by Baker and Kaufmann, is a series of pictures

requiring judgment of missing parts, differences, similarities, and so forth. The test has been well standardized for kindergarten children; percentile values based on test results of 895 children are given. However, the standardization did not extend below 5 years. It is an individual test, has interest for children, and requires only a short time to administer. It is sufficiently simple to warrant its use with children under 5. It has been tentatively standardized for fifty 3-year-old and fifty 4-year-old children by Mrs. Elizabeth G. Anderson at the Merrill-Palmer School, Detroit.<sup>1</sup> The test is not sufficiently varied in content to warrant its use as a complete measure of intelligence. Its chief value is as a supplementary test.

**Rhode Island Intelligence Test.** The Rhode Island Intelligence Test (1923) was devised by Grace E. Bird and Clara E. Craig as an individual test for children from 3 to 6 years of age (11). It consists of a series of pictures requiring judgment of similarities and differences, omissions, and the like. Many of the pictures offer the possibility of chance success, which lessens the value of the test. It has too little variety to warrant its use as an independent test of intelligence.

**Pintner-Cunningham Primary Mental Test.** The Pintner-Cunningham Primary Mental Test (1922) (49, 50) is noteworthy as the first attempt to apply the group test to children under 5 years of age. It is an attractively organized test, with small pages easily handled by young children. The drawings are distinct and well executed, and are not confusing. The material, which has considerable variety, consists of a series of pictures interesting to children. The test is standardized on 856 cases from 4 years 0 months to 9 years 0 months. The number of cases for the preschool age is small. From 4 years to 4 years 5 months there are seven cases; from 4 years 6 months to 4 years 11 months there

<sup>1</sup> This study has not yet been published.

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are thirty-four cases, a total of forty-one cases for year 4. From 5 years on, the standardization is much more adequate.

**The Cole-Vincent test.** Another group test that extends the norms to children under 5 years of age is the Cole-Vincent Group Intelligence Test for School Entrants (15). This is a twelve-page booklet containing ten separate tests that have unusual variety of content. Several of them are new and original. The norms and the directions for administering the test are printed on each test blank. Norms are given for corresponding Binet mental ages for 1075 pupils from  $4\frac{1}{2}$  to 9 years of age.

Other group tests that are standardized for kindergarten and primary groups fail to include age groups under 5 years. A group test with young children is not of great value. The chances of error and the difficulties in administering increase rapidly with decreasing age. Furthermore, it would seem that a test that includes only reactions to pictures fails to offer sufficient variety for adequate diagnosis.

### SUGGESTED SCALES

The two suggested series of tests described below have not been standardized in a scaled form.

**Descoeudres' metrical scale.** Considerable experimental work with the preschool child has been done by the Belgian educators Decroly and Degand. Their investigations have taken the form of analyses of particular abilities shown by the child, and an effort has been made to organize the results into set tests. Alice Descoeudres has elaborated the studies made by these earlier investigators and has standardized a series of tests on children in Geneva (19). These tests were given to children from 2 to 8 years of age. The series includes tests of number concepts, language development (in French), observation, manual dexterity, and judgment.

In this series of tests the device of the lotto game is utilized in a most interesting way in the matching of color, form, and number. The tests are scored and discussed separately. The age range is from 2 to 7 years, with some suggestions for the ages from 8 to 14 years. The age level for each test item is determined by the fact that 75 per cent of the children taking it at a given age have passed it. A tentative scale of sixty-eight test items has been worked out on this basis. The age range is from 2 years to 8 years, with class intervals of six months. The scale of tests is not evaluated as a whole so that one may know what score to expect of children of different ages. Test results on a total of more than three hundred children are included in this study, but the statistical evaluation is much weakened by a division of the small number of cases included in each age group into four smaller groups, giving results for each sex and for two social levels separately. This test is at present arranged in French and is not applicable to American children.

**Schwab's tests of mental level and steps of development.** A series of tests for children from birth to 3 years has been suggested by Dr. Georg Schwab (56). Ninety-two tests — from six to eight for each age group — are included. A summarized statement of these tests will be of interest :

*Birth*

- A. 1. Yawning, swallowing, coughing, and crying.  
2. Prompt contraction of pupil of eye to light.  
3. Lively movements of arms, legs, fingers, and toes.
- B. 1. Sucking on an object placed in the mouth.  
2. Sucking when placed at the mother's breast.  
3. Shrinking of body and fluttering of eyelids at shrill tones.  
4. Characteristic grimace called forth by sweet and bitter.

*First month*

- A. 1. Coördinated movement of the eyes.  
2. Better motor coördination.

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3. Attention to strong visual or auditory stimuli.
4. Differentiation of crying — hunger cry, fear cry, etc.
5. Brief, independent lifting of head.

- B.*
1. Attention to and expression of pleasure at sight of bright, glittering objects.
  2. Following with eyes a moving source of light.
  3. Closing hand when the palm is touched.

### *Second month*

- A.*
1. Babbling (ä-rä-örö-lala).
  2. Expression of pleasure or displeasure.
  3. Accommodation of pupil of eye for near and far.
  4. Head held a short time in raised position.
- B.*
1. Prompt acquisition of simple conditioned reflexes.
  2. Coördination and fixation of eyes on small near objects.
  3. Tight clasping of objects placed in hand.

### *Third month*

- A.*
1. Spontaneous voluntary fixation of eyes on objects.
  2. Voluntary movement of arms and hands.
  3. Free movement of the head.
- B.*
1. Grasping or repelling of objects.
  2. Tasting objects placed in hand.
  3. Turning head toward pleasant sounds.

### *Second quarter year*

- A.*
1. Experimentation (objects seized and destroyed).
  2. Looking after a falling toy.
  3. Consonants used more in the babble (dentals and sibilants).
  4. Rising, sitting up alone.
- B.*
1. From fifth month, opposition of thumb and fingers in grasping.
  2. Recognizing persons with visible expression of pleasure.
  3. Outspoken reactions of fright at strangers or large unknown objects.
  4. Threat and anger shown in child's crying.

*Third quarter year*

- A.
  1. Searching with the eyes for fallen toys.
  2. Preference for right hand in grasping.
  3. Increase in variety of affective expressions.
  4. Sitting and creeping.
- B.
  1. Obeying command, given by gestures, that he arise from pillow.
  2. Answering, by pointing, to such questions as, "Where is the bottle?" "Where is the watch?"
  3. Beginning imitation of simple actions.

*First year*

- A.
  1. Free expression (willful throwing of toys on floor, etc.).
  2. Pleasurable discrimination of yellow and red.
  3. Standing alone and walking.
  4. Control of urine at night.
- B.
  1. Imitating complicated movements (pounding with a hammer, etc.).
  2. Following learned conventional commands ("Give me your hand," etc.).
  3. Answering by pointing, "Where is the nose, ear, mouth, leg?"
  4. Singing tones in imitation.
  5. Babbling becomes imitative.

*Fifth quarter year*

- A.
  1. A vocabulary of six nouns.
  2. Complete understanding of uncomplicated gestures.
  3. Enlargement of expressions of feeling (tenderness, etc.).
- B.
  1. Obeying complicated commands ("Close the wardrobe," "Blow out the candle").
  2. Following complicated imitations (opening and closing both hands, shrugging the shoulders, etc.).
  3. Giving first and last names.
  4. Imitating the singing of simple melodies up to three different tones.

*Sixth quarter year*

- A.
  1. Pleasure in hide-and-seek.
  2. Indicating position and direction by forefinger.

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3. Walking becomes automatic and does not require child's attention.
4. Expressing consciousness of guilt, jealousy, and sorrow.
- B. 1. Finer differentiation of speech articulation (ohr, uhr; hand, sand).
2. Understanding complicated words (thermometer, etc.).
3. Carrying out complicated commands (plaything is brought from closed closet, etc.).
4. Giving on command characteristic sounds of known domestic animals.

### *Second year*

- A. 1. Questioning spontaneously.
2. Showing thoughtful tendency and more variety in play.
3. Imitating simple songs.
4. Imitating simple childish plays (finger plays, etc.).
5. Running, walking backward, balancing.
- B. 1. Carrying out two commissions.
2. Repeating one-syllable words.
3. Following commands to perform A3 and A4.

### *Fifth half year*

- A. 1. Eating alone without soiling the clothes.
2. Discriminating all colors — red, green, yellow, blue, orange, and violet. (Color names are not always given correctly.)
3. Climbing on chair and stool, jumping from heights.
- B. 1. Showing decided impressions of taste.
2. Obeying of complicated commands, as follows: (a) Fetch the scissors from the cupboard and cut the paper. (b) Get a little spoon, a big spoon, and a fork from the box of silver. (c) Go into the other room and get father's hat and cane.
3. Repeating unfamiliar one-syllable words. Repeating familiar two-syllable words.
4. Repeating one-place numbers; must do three fourths of total attempted.
5. Pointing out familiar objects in pictures.

*Third year*

- A.
  1. Consciousness of existence as a separate individual is in the foreground.
  2. Emotional expression of obstinacy, embarrassment, and shame more evident.
  3. Reaction of sense of honor more intensive.
- B.
  1. Naming colors — red, yellow, and green.
  2. Localization of touch, over whole body.
  3. Recognizing simple objects in pictures.
  4. Repeating short verses.
  5. Repeating immediately three-syllable words and sentences.
  6. Answering questions regarding use of simple objects, as follows: "What does one do with the ball?" "What is a knife for?" "What is soap for?"

Schwab describes these tests briefly. Many of them are adaptations of or are similar to those presented by other investigators, but some are new and seem promising additions to testing programs for young children. The description of the method of administering the tests is too brief, and the scoring tends frequently to be too subjective in nature to warrant the use of the tests without modification. Schwab does not indicate that he has made any attempt to standardize the material. There is no reference to a published report of the standardization; nor, in fact, is there any indication of a realization that standardization is necessary. The author does not mention having tried out the tests at all. Many of the tests are misplaced as compared with the findings of other investigators. However, the series is noteworthy in that it presents for the first time tests for children of 15 months.

GROUPS OF TESTS NOT ORGANIZED INTO SCALES

Scarcely differing in value from some of the so-called scaled tests described in the preceding section, a number of tests have been published in which the separate items are



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more or less standardized but not organized into a mental-age scale or point scale.

**The de Sanctis tests.** De Sanctis proposed in 1906, and published in 1911, a series of six tests which has as its objective the classification of feeble-minded children from 7 to 16 years of age (18). Although these tests were not applied by de Sanctis to normal, younger children, they offer possible and interesting material for this purpose. The extensive use of these tests and their further adaptation as tests of intelligence were prevented by the overwhelming interest shown by psychologists everywhere in the new Binet series which appeared two years after the de Sanctis tests were proposed.

**Simon's schedule for observation of a young child.** In 1916 Simon published an elaborate schedule for observing children from birth to 2 years of age (58). Suggested age norms are given, but the number of cases on which these are based is not stated. The purpose of this schedule or questionnaire is to guide the observation of parents. Simon suggests that if this schedule were followed carefully by many parents the results would be a valuable contribution to our knowledge of the period of infancy. In order that the results may be more reliable, careful instructions for the use of the questionnaire and the methods and time for making the observations, as well as a detailed analysis of the questions and tests, are given. For the first time, interesting observations are made regarding the necessity of following a special test procedure with young children. The variety and multiplicity of the questions are admirable.

**The Peiser tests.** In 1920 Julius Peiser published a series of performance tests which he had given to children of the middle class in Berlin (48). He published no statistical evaluation, nor did he state how many children were tested. The tests, however, are of interest. They seem to

have been suggested by the experimentation of Köhler. They consist of the following groups:

1. *Tests in which the child is to get an object that is out of his reach.* Objects are placed so that the child can get them in one of the following ways: (a) by pulling bedspread on which the object is placed, to bring it closer; (b) by using a string that is attached to object, which is placed in different positions; (c) by using a stick, a straight cane, and a cane with a crooked head to bring the object within reach.

2. *Box test.* Two boxes, differentiated by a red cross and a green cross, or by crosses of different sizes, are shown to the child. In full view of the child an object is hidden in one of the boxes. The child is to indicate the one in which it is hidden.

3. *Match-figure imitation.* Matches are arranged in little figures, and the child is asked to imitate these arrangements.

4. *Discrimination of strings.* One string is attached to the object to be attained and the other is not.

5. *Ring and string problem.* A brass ring is placed on a string attached to a little stick; the child must free the ring.

6. *Two-canes problem.* An object too far away to be reached with either of two canes — one crooked and one straight — can be reached by slipping one cane into the end of the other.

7. *Sorting of nails.*

Peiser finds that the following ages are about representative for the different tasks:

*Last quarter of first year.* Test Group 1 — more or less direct means to an end.

*Second year.* Indirect means to an end — stick and object, or string and object.

*Third year.* Box problems with simple form discrimination; more complicated string problems.

*Fourth year.* Box problems with discrimination of complicated signs and colors; ring and string problems; problem of two canes.

*Fifth year.* Ready comprehension of box problems; discrimination of boxes with diagonal designs; match-figure imitation.

*Sixth year.* Sorting of nails; greater ease in performing the other problems.

Peiser gives a good discussion of the value of performance tests for young children, not only from the point of view of

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studying mental development, but also from that of determining character trends and emotional tendencies.

**Observations of early infancy by Watson and others.** Watson (74) and other investigators at Johns Hopkins Hospital have made an extremely valuable contribution to our knowledge of early infancy. There is no statistical analysis of the material, but Watson states that several hundred children were observed during the course of the study. The first report of this study was made by Margaret Blanton in 1917 (12). The problems were (1) to find what activities can be seen at birth and what appear as the infant increases in age, and (2) to make an experimental study of the emotional life of the child. In the first study the instinctive equipment of the child and the development of early reflexes and habits were observed. In the second study the fundamental emotions of fear, love, and rage were analyzed as to the initial stimuli required and the conditioning of these emotional reactions by other stimuli. Although the information gained from this study is not given in the form of a test, a statement is made of the normal time of appearance of the various reflexes, instincts, and habits studied in the investigation, and this statement is of value to the clinical psychologist.

**The Shermans' study of sensorimotor responses in infants.** In 1925 Mandel Sherman and Irene C. Sherman published a report on observations of sensorimotor responses in infants (57). This study included five types of responses, as follows:

1. Response of pupil to light.
2. Plantar reflex.
3. Reaction to a pain stimulus.
4. Coördination of the eyeballs in following a light.
5. Coördination of the arms (pressure on chin eliciting defense reactions).

From this excellent preliminary study the writers conclude that a quantitative genetic study of sensorimotor responses in infants is possible. They suggest that through such methods it may be possible to get at the normal rate of development in infants and to make an accurate determination of degrees of abnormality or of retardation in development in individual cases.

Buford Johnson's study of performance tests for young children. In 1925 Buford Johnson reported an intensive study of children from 2 to 13 years of age which the Bureau of Educational Experiments, New York City, had carried on over a period of several years (35). In this study the children under 5 years old were given the Pintner-Paterson tests, the Rossolimo series of dissected pictures, the Witmer Cylinder Test, the Healy Pictorial Completion Test II, and the Woodworth and Wells Action Agent Test, in addition to the Stanford Binet test. The number of children included in this study — especially of children under 4 years of age — was small, as the following figures indicate:

AGE (Years)	RANGE OF CASES
2.0 . . . . .	1 only
2.5 . . . . .	1 to 5
3.0 . . . . .	1 to 11
3.5 . . . . .	1 to 19
4.0 . . . . .	1 to 44
4.5 . . . . .	12 to 41

The findings are interesting and suggestive. Standard deviations, means, and medians are computed, but the number of cases is too small and the selection too restricted to warrant their use as norms. Certainly definite conclusions about mental development cannot be drawn from the study of so small and selected a group of children.

**Iowa studies of the preschool child.** Numerous studies of the preschool child were made by Bird T. Baldwin, or under

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his direction, at the Iowa Child Welfare Research Station. So far none of the material developed in these studies has been published in the form of a series of standardized tests. In 1924 Baldwin and Stecher published an interesting and suggestive book, *The Psychology of the Pre-School Child* (4), which gives elaborate data on test results on the children studied in the preschool psychological laboratories. This study offers valuable suggestions concerning tests suitable for preschool children and gives the average scores for the age groups tested. The authors realized that the number of cases (a total of 105 children) was too small to render the results suitable for norms. The following figures show the number of children of each age level included in the experiments :

AGE (Years)	NUMBER OF CHILDREN
2 . . . . .	3 to 9
3 . . . . .	10 to 40
4 . . . . .	13 to 24
5 . . . . .	3 to 33
6 . . . . .	5 to 21

Some of these children were evidently tested at different ages, since the study covers a period of several years. The number of cases is as large as that in some so-called test standardizations. The authors have been wise in not weakening their data by subdividing them into smaller age groups or by insisting that all analyses be made on the basis of sex differences.

The tests used in these studies are for the most part not original, though many of them have been altered to make them more suitable for use with young children. Several new tests are suggested. The following are of interest :

*Card Sorting Test.* The card sorting test, which involves discrimination of form, was devised as a means of studying the practice curves of young children. Fifty cards

with ten geometrical designs (five cards of each) were used.

*Form Cancellation Test.* This is a test of "ability to distinguish simple forms and the motor control in the movements of marking with a pencil." The Woodworth and Wells substitution blank was used. The child was asked to mark out all the forms of one type on the sheet.

*Perforation Test.* This test consists of punching holes in a sheet of bond paper on which is outlined a checker-board of circles.

*Picture Memory Test.* This is a test of the child's ability to recognize and select on a chart, after it has been exposed for five seconds, the counterpart of a small black and white picture of a familiar animal or object; five additional seconds are allowed for each additional object to be remembered.

*Color Card Sorting.* In this test the child is asked to sort into five boxes marked with the colors of the squares to be placed in them one hundred cards, on each of which is pasted a small color square cut from the Woodworth and Wells color-naming blank.

*Picture Vocabulary Test.* Fifty black and white pictures of common objects, pasted on 3-by-5-inch cards, formed the material for this test. The children were asked to name these objects, the naming varying in difficulty.

**Andrus's Inventory of Habits of Children from Two to Four Years of Age.** An interesting approach to the study of preschool children is the work done by Andrus, who has set up an inventory of the habits of children from 2 to 4 years of age as a basis for the observation of children in actual life situations (1, 2). Fifty-two children in four different nursery schools were studied in the formation of the

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inventory. The mean standings and probable limits of normal variation have not been worked out, but Dr. Andrus states that she hopes to make these data available. The inventory has four sections, covering the emotional, mental, motor, and social-moral habits of the child. It is set up in the form of questions, with 75 questions relating to emotional habits, with a maximum score value of 224 points; 111 questions on mental habits, with a maximum score value of 226 points; 112 questions on motor habits, with a maximum score value of 224 points; and 75 questions on social-moral habits, with a maximum score value of 108 points.

The study has great value as an attempt to study the child as a whole. Other studies have tended to neglect the emotional and social aspects inseparable from mental development. The scoring of the inventory in its present form is necessarily subjective, but when adequately standardized the inventory will be a valuable contribution to the possibilities of mental diagnosis.

**Gesell's developmental schedules.** Gesell published in 1925 a schedule of development, somewhat similar in form to the earlier Simon questionnaire, for the first five years of the child's life, beginning with the newborn child (22, 23). The normative items are classified into four groups of behavior, as follows: Motor, Language, Adaptive, and Personal-Social. The levels of development studied are "neonate," and 4, 6, 12, 18, 24, 36, 48, and 60 months. Separate schedules are given for each level of development. The frequency with which each item occurs at a definite age level is indicated by the letters *A*, *B*, and *C*. The classifications run as follows:

- A* + equals success in from 1% to 19% of the cases.
- A* equals success in from 20% to 49% of the cases.
- B* + equals success in from 50% to 64% of the cases.
- B* equals success in from 65% to 84% of the cases.
- C* equals success in from 85% to 100% of the cases.

There is no attempt to secure equality of the grades of success for the different age levels, but each level has forty to fifty items well distributed in difficulty between these five grades of success. To facilitate the scoring and evaluation of the schedules, Gesell indicates different grades of success for many of the test items, so that it is possible to rate the child's performance on the task presented as *A*<sup>+</sup>, *A*, *B*<sup>+</sup>, *B*, or *C*. Thus when the series of items is scored, a general idea of the child's developmental level can be obtained by studying the various grades of success attained. It is unfortunate that the symbols used to indicate degrees of success are *A*, *B*, and *C*, since these, in the minds of persons accustomed to interpreting mental-test scores, have an entirely different value from those they have in this schedule of tests. For example, the score *C* usually indicates average ability, while in the Gesell scales an item is designated as *C* when from 85 to 100 per cent of the children tested at the age level in question pass it. An average performance on the Gesell scales is not clearly indicated. The average for any age level may be either an *A* or a *B*<sup>+</sup> activity for that level. In the group of children used in standardizing the activities, any particular *A* test may have been passed by 20 to 49 per cent of the children, and any particular *B*<sup>+</sup> test may have been passed by 50 to 64 per cent of the children. Consequently, in this rough classification there is no possibility of finding the at-age value of any test.

The elaborate series of observations made by Gesell has not lost all value because of this defect in his work, however. He has provided an unusual variety of tests which have the merits of being easily administered and well adapted and interesting to the young child. The procedures are better standardized than those of any earlier test series for preschool children. The children were carefully selected, with exactly fifty cases for each age group, and all were



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tested within two weeks of their birthdays, except at the age of 5 years, where a latitude of 1 month was allowed. Unfortunately, after the 2-year level separate schedules are given for yearly intervals only. This method fails to take into account the rapid development of the child during the years from 2 to 5. The child of  $2\frac{1}{2}$  years and the child of  $3\frac{1}{2}$  are thus completely left out of the picture.

In making the scoring of this series of developmental items indefinite and vague, Gesell has taken a legitimate stand against the current tendency to place too much reliance upon an exact score obtained from poorly standardized material. Had his tests been more carefully evaluated, however, this tendency might have been effectively corrected and at the same time a more satisfactory tool might have been placed in the hands of persons who feel the necessity of exact scores. Vague and ill-defined measures are as much in danger of misinterpretation as are those that imply great exactness where it does not exist.

### SEPARATE TESTS

Few persons who have devised and standardized separate tests have thought them adequate in themselves as tests of intelligence. They have usually presented these tests, rather, as a means of gaining certain significant supplementary data; and for this purpose separate tests are very useful. With a sufficiently varied group of these separate tests a fairly accurate estimate of the mental level can be made.

Like the scaled tests, most of these separate tests have touched the preschool level only incidentally. They have for the most part begun with the youngest children obtainable through the public school system. Some of the most valuable tests for preschool children have been introduced as separate tests, though the number really standardized for the preschool ages is surprisingly small.

**Seguin Form Board.** The form board introduced by Seguin has had many modifications and has been very carefully studied. Goddard (27), Sylvester (62), Pintner and Paterson (51), and Wallin (71, 72) have utilized this board as a test. Of the studies made by these men the latest, by Wallin (72), carries the norms for the form board through the fourth year. Although only twenty-two children of that age were studied, Wallin finds that the younger the child the longer is the time required for the test. He suggests that it is possible to establish half-yearly norms of psychomotor development from the ages of 2 to 8, and that from 12 to 17 years the norms should be biyearly.

**The Witmer Form Board and Cylinders.** Witmer has done interesting work with test materials suitable for preschool children. The Witmer Form Board and the Witmer Cylinders have both been studied with a large number of children. Ide in 1918 published the results of these tests of children from 2 to 6 years of age (33). Four hundred forty-nine 5-year-olds, three hundred eleven 4-year-olds, and twenty-eight 3-year-olds were studied. The 4-year and 5-year age groups were redivided into four groups, the mean ages of which were 4.25, 4.75, 5.25, and 5.75 years, respectively. Quintile tables were given of the age groups separately by sex. The 4-year-old children were unable to do the Cylinders, but the Form Board was completed by all the 4-year-olds and by the twenty-eight 3-year-old children included in the study. Ide found that there was little difference between the performance of the two 5-year-old groups, but considerable difference between that of the two 4-year-old groups. There was no evidence of sex differences.

**Wallin Peg Boards.** From Wallin's valuable contributions to clinical psychology have come the peg boards, which are admirably suited for testing preschool children, especially at the ages of 18 to 48 months. In 1918 Wallin published

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results on these peg boards for 101 children ranging in age from 9 months to 8 years 2 months (72). The results for these children were published in detail. Wallin realizes that the number of cases is too small to be reliable, but believes that they offer a suggestion as to the merits of the test. Wallin has seen the necessity of studying young children in groups of small age range and has, therefore, used age intervals of six months for the ages from 1 to 8 years. Results are given for eighty-two children under 5 years of age.

**Picture recognition test.** German investigators have made some interesting studies with picture recognition. The test materials consist of groups of picture series, the first of each series a bare outline, the second having a slight addition of detail, and so on until the picture is presented with detail complete. Van de Torren made a study of this type in 1908, and Gustav and Ada Schrober made a more extensive and better-organized study in 1919 (55). Sixteen picture series were given on the following subjects: fish, washbowl, pig, sprinkling can, cat, automobile, Santa Claus, hat, wheelbarrow, snow man, cap, cup, watchman, bell, street car, and cannon. There were great differences in the difficulty of the series and in the children's reaction time. Each picture was presented to the child for twenty seconds, and the child's response was recorded. Results are given in terms of the percentage of children of each age level who made a score equal to the best score made at that age level. The investigators studied twelve children of each of the ages 4, 5, 6, 7, and 8 years. There were six boys and six girls of each age. The data are much weakened by a division of the results, not only according to age and sex but also according to social level, into a superior and an inferior group. The results are of value chiefly as suggestions for further organization and standardization of an interesting test method.

**Woolley-Cleveland standardization of the Montessori Cylinders and the Pink Tower.** Because of the interest displayed in the Montessori Cylinders and Pink Tower by the children of the Merrill-Palmer nursery school, and because the older children readily succeeded in doing the tasks the first time they were presented, Woolley and Cleveland decided to utilize this material for test purposes. The report of their study appeared early in 1923 (78). One hundred fifty children were tested in this investigation — fifty at each of the ages 3, 4, and 5 years. Norms are given for the three sets of Cylinders and the Pink Tower in the form of decile tables. This was the first time that so careful a method of evaluating results had been used in standardizing tests for preschool children.

A comparison of test results was made with Stanford Binet mental-age scores. In selecting cases, an effort was made to obtain samples of different social levels in order to have a set of norms as representative as possible of the hypothetical average child. These tests make a helpful addition to the brief list of available supplementary tests for little children.

**Goodenough's Drawing a Man Test.** A recent attempt to utilize one type of performance as a measure of intelligence is the Drawing a Man Test standardized by Goodenough (28). In this test the child is asked to make "the very best picture of a man" that he can make. The age range is from 4 to 12 years. The test was given to 5627 children, including 176 normal 4-year-olds. No children under 4 are included in the statistical analysis. The test is scored on the basis of age and grade differentiation; one to fifty points are assigned, depending upon the degree of development shown in the drawing. The test is sufficiently well standardized to offer no objection from that point of view. The scoring offers some possibility for subjective

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error, but the author has been so skillful in giving detailed directions that this difficulty is largely eliminated. The test seems to be of value as a supplementary test, but its use as an independent measure of intelligence is to be questioned because of its lack of variety.

### RECENT TESTS PUBLISHED SINCE THE STANDARDIZATION OF THE MERRILL-PALMER TEST

**Bayley's performance tests.** In 1926 Bayley (5) published a preliminary report on a series of eight performance tests given to 106 children ranging in age from 2 years 7 months to 6 years 8 months. The material is attractive and has variety. The methods of administering and scoring the test are carefully described, and a suggested test blank is presented. The author does not consider these preliminary data an adequate standardization, but suggests that a further standardization of the material should be made.

**Jones's study of early behavior patterns in young children.** A study of the behavior responses of infants under 1 year of age was reported by Mary C. Jones (34) in 1926. She made repeated systematic observations, totaling 735, on 365 infants over a period of eight months. The observations were made on smiling, eye coördination (horizontal, vertical, and circular), blinking, head support, thumb opposition, reaching, sitting, and the Babinski reflex. Percentiles were computed from a smoothed curve.

**Charlotte Bühler's and H. Hetzer's inventory of the behavior patterns of children during the first year.** In 1927 Charlotte Bühler and H. Hetzer (13) reported a study of the behavior patterns of sixty-nine Viennese children under one year of age. Forty per cent of these children were observed in their own homes, where conditions were kept as normal as possible. The observations covered a total of 1620 hours and in most cases represented a 24-hour period

for each child. The daily distribution of activities at successive ages is analyzed.

**The CAVD Tests.** Thorndike has devised a scale of tests for the measurement of ability in completions, arithmetic, vocabulary, and directions. Working under the direction of Thorndike, K. S. Cunningham (17) published in 1927 a study of the suitability of the test for use with young children. Mean scores are given by half-yearly chronological age groups from  $2\frac{1}{2}$  to  $5\frac{1}{2}$  years for a total of 243 cases. Owing to the large language element in the test, it is of less interest to young children than are tests involving material of a manipulative type, but the author finds it possible to secure the coöperation of young children in a test of this type.

**B. V. Cunningham's study of gross motor development.** Bess V. Cunningham (16) published in 1926 a preliminary report of a study in which she attempted to test gross motor coördination of young children as distinct from general intelligence and from physical growth as judged by anthropometric methods. She studied 100 children ranging in age from 12 to 42 months and representing, as far as possible, a normal sampling. Physical measurements were taken and either the Stanford Binet or the Kuhlmann-Binet test was given in connection with periodic tests of motor coördination. The results showed moderate or low correlation of the data on physical measurements and general intelligence with those on motor coördination. The forty-seven items are ranked according to difficulty and arranged in six-month age groups.

**Hallowell's series of mental tests for preschool children.** In 1923 Hallowell (29) began the standardization of a series of tests for children from 12 to 48 months of age. A report of this work was published in 1928. Three form boards, the four Wallin peg boards, a color-matching test, and a test of memory span for digits were the tests given to 657 chil-

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dren selected from a wide range of social and economic levels. Standards are given in terms of decile tables for groups at two-month intervals, a finer age division than has been used in any preceding test for preschool children.

**Linfert and Hierholzer scale for infants during the first year of life.** Under the direction of Furfey at the Catholic University of America, Linfert and Hierholzer (44) standardized a series of tests for infants during the first year of life and presented the tests in age-scale form. Three hundred infants were tested, fifty of them repeatedly, at different age levels. Two series of tests were devised, the first with twenty-nine items for children from 30 to 152 days of age, and the second with thirty-five items for children from 153 to 365 days of age. Separate norms for each series are presented in terms of percentage of tests passed. The mental ages are given in terms of days.

## CHAPTER THREE

### CRITERIA FOR THE SELECTION OF TESTS FOR PRESCHOOL CHILDREN

BECAUSE of the immediate need for more suitable tests for preschool children, an investigation was begun by the writer at the Merrill-Palmer School in 1922, under the direction of Dr. Helen Thompson Woolley. At the time the investigation was initiated, there were no scales of intelligence tests applicable to preschool children except the several revisions of the Binet tests, all of which were scantily standardized and overweighted with tests of a verbal type. It seemed highly desirable that something should be done to improve this situation. The question to be answered was: How can a scale of tests be formulated which can be used as either a substitute for or a supplement to the Binet scaled tests and which will give a better all-round picture of the abilities of preschool children?

In so difficult an undertaking it was necessary to formulate a set of objectives to serve as a guide. The objectives described in this chapter were set up for this purpose. It is believed they may prove generally useful as criteria in judging tests for preschool children.

The test material should have inherent interest for the child. In order that the examiner may elicit full coöperation from his subject, he must have at his disposal a group of tests so interesting that the child will coöperate with real enthusiasm. The incentives for coöperation and effort are very elementary at the preschool level. The younger the child the more difficult it is to get him to react to stimuli that have little inherent interest. Older children will respond to such stimuli because they have developed an interest in competition and the desire to appear well before an admired adult. Small children are little affected by these



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incentives; they must be amused. Accordingly, at least the majority of tasks used as tests must have this capacity of amusing the child. With such a group of tests as a basis it is possible for the skillful examiner to add a smaller group of tests having less inherent interest but sometimes greater diagnostic value.

**A large variety of activities and abilities must be tested.** It is a common belief among specialists in mental testing that to be valid a scale of tests must be made up of a large number of separate tests of sufficient variety to insure not too high intercorrelation. Such low intercorrelations, it is believed, indicate that different abilities are being tested; and a series of diversified tests will presumably be a better sampling of the total ability of the individual than will a series in which the items are so like one another as to test a narrow range of abilities. This requirement is just as valid with scales for young children as with those for older children. It cannot be predicted that because a child does well on one type of test he will do well on another. He may or he may not. Frequently an erroneous idea is gained of the child's ability when it is judged solely on the basis of response to a series of tests similar to one another in type. Failure on a particular test may be due to a real lack of ability to do the task, to lack of experience and opportunity, to circumstances of administering, or possibly to the fact that there was previous unfavorable conditioning to responses called for by the tests."

**There should be variation in difficulty of the test items.** Ideally, the test items should vary in difficulty to such an extent that the dullest child can pass the easiest one and the brightest child will fail the most difficult. This rule should hold true at every age at which the scale is considered valid. Otherwise there will be "bunching" of scores at each end of the scale; there will be many young children

who will be rated too high and many older children who will be rated too low. The tests should be so graded in difficulty that they form equal or approximately equal steps from the easiest to the most difficult. A grouping that represents unequal gradations in difficulty makes for distortion of the norms in an age scale and adds to the unreliability of the intelligence quotient.

**The test results should be influenced as little as possible by the child's training and environment.** Elimination of the effect of training and environment from the mental test is of course an impossibility. Yet tests differ greatly in the extent to which they are influenced by these factors. If the tests discriminate well between children who have had practically the same environment, then they offer considerable promise as tests of native ability. Tests that tap abilities every child has had some opportunity to develop, such as discrimination of colors and judgment of size and shape, seem to be the most favorable measures of difference in ability, especially if the form of the test is so new that the child's adaptability is tested also.

**Simplicity of material is an asset.** Complicated machines and elaborate devices for testing are a handicap in establishing rapport with the child. Young children are frightened or repelled by the strange and unusual. Tasks that seem to the child to be games and involve objects similar to those with which he is familiar elicit interest and immediate participation. Large and cumbersome test material cannot easily be transferred from place to place, and hence is not practical for elaborate testing programs. Furthermore, the more complicated the material the more difficult is its duplication.

**The tests should be easy to administer.** The tests should be easy to administer and easy to keep in mind so that the examiner may be freed for the more important aspects of

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personality adjustment and detailed observation of the child. A simple, uncomplicated test is best adapted to this end. Such a test also helps to eliminate the possibility of error. The objective of every examiner should be the establishment of a habitual, uncomplicated technique of administering the tests. The less complicated the routine of presenting the tests, the more time will the examiner have for the recording of observations.

The methods of scoring should be objective, eliminating subjective judgments as far as possible. The primary purpose of mental tests is to give objective methods of rating ability. It is this objective rating which differentiates a mental test from other methods of estimating mental level. The most satisfactory tests are those that offer little possibility for subjective errors in scoring. Such tests include timed tests, self-corrective tests in which the failure is obvious to the subject, and tests in which provision is made for the standard scoring of all possible results. To make for accurate and reliable tests, each step in the administration and scoring should be made clear, and each contingency foreseen and provided for.

The test items should show a marked differentiation between the age groups included in the study. In the standardization of tests it is customary to divide the children tested into groups, usually on the basis of chronological age but occasionally by some other criterion such as the school grade attained. The distribution of scores and the average score for the various test items are then studied for each group separately. Within limits, the more rapid the decrease in the difficulty of a test with increasing age, the greater is the diagnostic value of the test. The age value of a test is the age at which 50 per cent of the children are successful. Ideally, the test item will then represent so well the ability of the age group selected that all but a few

children in the next younger age group will fail it and all but a few children in the next higher age group will be successful. Tests that show a slow, even though constant, increase in the percentage passing with increasing age are usually unreliable.

The age range of each group should be small enough to prevent a high positive correlation between the score and the age of the child within the group. This ideal is a difficult one to attain with young children. Since mental growth is very rapid during the preschool years, the age range of the test groups must be small. This requirement is especially urgent when the tests are evaluated by percentiles or standard deviation. In tests so evaluated a large age range involves the fundamental error of considering all the children within the group on a par chronologically, though their ages may vary by an interval of several months. In some of the tests so evaluated, for instance, children 3 years old and children 3 years 11 months old are scored as if they were of the same age — a method obviously misleading when one considers the great development of the child during the third year. Any method that, at the attainment of another day in age, arbitrarily considers the young child as even three months older distorts the value of the results.

Age scales that give the child the benefit of monthly increments in chronological age would seem at first sight to be free from this error. However, an analysis of the methods involved in the standardization of such scales reveals that the fundamental error exists here also, though it is not so apparent. An ideal age scale would have the test items increasing in difficulty in evenly graded steps so that we could say, for example, Test Item 3 is just one step more difficult than Test Item 2 and Test Item 4 is one step more difficult than Test Item 3; then if the child were scored by mental age and this were compared with his chronological

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age, his ability would be fairly judged at his own age level. Unfortunately, there are no equal-step scales, and the difficulty of test items does not increase in evenly graded steps.

The selection of cases should be as near a sampling of the whole community as possible. If the standardized scale of tests is to be suitable for use with children of all classes and conditions of society, it must be as nearly representative of them as possible. Tests cannot be standardized on the preschool children of a university faculty or on the children of a nursery school and be utilized with any degree of confidence as a measure of rural children or of children in a settlement. It is true that great variability exists within one social level, but because of the selective forces that affect the heredity of children from different levels and the great environmental differences involved, it is as essential to select carefully a sampling of the whole community in the study of young children as in the study of school children and adults.

The group tested should be large enough to render the conclusions valid statistically. The number of children necessary for the standardization of a scale of tests depends upon many factors. In the first place, the age range covered by the test series affects the number required. If the scale is planned for children from 3 to 15 years of age, the number of children required is much greater than if the scale extends from 3 to 6 years. The size of the age-group division also affects the total requirements. If the age-group intervals are bimonthly, the total number of cases should be much greater than if year intervals are used. The size of the interval required depends upon the age of the child; the younger the child the smaller is the interval required, and consequently the greater the number of cases needed for adequate standardization. Furthermore, the number of cases required increases with the degree of completeness of

the sampling of all levels of society. No one has ventured to state just how many cases should be included in an age group to render the norms fairly stable. The minimum number of cases required for any age group is perhaps three or four hundred. The present preliminary norms for the Merrill-Palmer test include only from fifty to one hundred cases, which is too small a number to insure the degree of stability that is desirable.

The final scale must be easy to score. Even if a scale of tests is adequately standardized and carefully worked out, its value will be reduced if the methods of scoring are complicated. Ease and simplicity of scoring will make the scale practical and useful. To attain this end it is necessary to present to the examiner a test blank that offers as much help as possible in the administration of the test. Such a blank makes for greater accuracy and frees the examiner for closer observation of the subject, and thus for better testing.



**PART TWO**  
**THE MERRILL-PALMER RESEARCH**





## CHAPTER FOUR

### PRELIMINARY EXPERIMENT

#### PLAN OF APPROACH TO THE PROBLEM

AFTER a careful evaluation of the existing scales of tests for preschool children was made in the Merrill-Palmer study, it appeared that, besides being inadequately standardized, these scales lacked many qualities desirable in mental tests for young children. Consequently, the immediate need for a well-standardized revision of one of the existing scales was sacrificed to the more time-consuming task of organizing a new scale of tests which, it was hoped, would supply as far as possible the elements missing in the scales then available. The plan of approach to the problem involved the following steps :

1. Selection from psychological literature of all the tests, presented or suggested, that seemed applicable to young children.
2. Selection of materials shown by observation of nursery school children to differentiate types of response at different age levels.
3. Adaptation of tests suggested by various expert observers of the mental growth of children. The advisors were Dr. Helen T. Woolley, Miss Emma Henton, and Miss Winifred Harley, all of the Merrill-Palmer School staff, and Dr. Guy M. Whipple, of the University of Michigan, who was at that time assisting in the supervision of the study.
4. Trying out upon the nursery school children at the Merrill-Palmer School the material obtained from the three sources named above.
5. Analysis of results and the selection of the test material that seemed most promising for further study and standardization.

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### TESTS TRIED OUT

In all, seventy-nine tests were tried out. Twenty-four of these were adapted from material that had already been suggested in psychological literature as useful for tests. Some had been partially standardized for preschool children, and others had been used only with children over five. The following tests were tried on the children at the Merrill-Palmer School :

- Free Association Test (Kent-Rosanoff) (36, 54)
- \* Action Agent Association Test (Woodworth and Wells) (76) <sup>1</sup>
- Agent Action Association Test (Woodworth and Wells)
- Ink Blot Test (Whipple) (75)
- Pintner-Paterson Tests (51)
- \* Seguin Form Board
- \* Mare and Foal Picture Completion
- \* Manikin
- Knox Cube Test
- Triangle Test
- Porteus Maze Tests (52)
- Weight Suggestion Test (Whipple) (75)
- Line Suggestion Test (Binet) (7)
- \* Peg Board A
- \* Peg Board B
- Peg Board C
- Peg Board D
- (Wallin) (72)
- Color-Cube Designs (after Kohs) (37)
- 3 copies of designs and 3 reproductions of designs from memory
- \* Little Pink Tower (Montessori)
- Construction Puzzle Cart No. 1
- Construction Puzzle Cart No. 2
- \* Copying Circle (after Kuhlmann) (40)
- \* Copying Cross
- \* Copying Star
- \* Pyramid 1 (3 cubes)
- \* Pyramid 2 (6 cubes)
- \* Picture Puzzle No. 1

<sup>1</sup> Tests marked with an asterisk were selected for standardization.

- \* Picture Puzzle No. 2
- \* Picture Puzzle No. 3
- Picture Puzzle No. 4
- Picture Puzzle No. 5
- Picture Puzzle No. 6
- Picture Puzzle No. 7
- Picture Puzzle No. 8
- Picture Puzzle No. 9
- Picture Puzzle No. 10
- Picture Puzzle No. 11
- Decroly Educative Games (19)
  - 2. Lotto of Colors
  - \* 3. Lotto of Forms
  - 4. Lotto of Tints
  - 5. Lotto of Two Colors
  - 6. Lotto of Positions
  - 7. Lotto of Color and Position
  - 8. Lotto of Sizes and Colors
  - 9. Game of Geometrical Figures
  - 10. Discrimination of Thickness
  - \* 11. Buttons and Buttonholes
  - 13. Identification of Number
- Nail Driving
- Taking Out Screws
- Inset Tracing (Montessori)
- \* Simple Questions
- \* Repetition of Words
- \* Repetition of Word Groups
- \* Simple Commands
- \* Throwing Ball
- \* Drawing Up String (Simon) (58)
- \* Matching Colors
- \* Sixteen Cubes
- \* Straight Tower
- \* Making Block Walk
- \* Nest of Cubes
- \* Identification of Self in Mirror
- \* Counting Two Blocks
- Counting Three Blocks
- \* Folding Paper
- \* Cutting with Scissors

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- Hitting Two Sticks Together
- \* Closing Fist and Moving Thumb
- \* Opposition of Thumb and Fingers (Goddard-Foote) (21)
- Clapping Imitation Test
- Movement Imitation Test
- \* Standing on One Foot
- \* Crossing the Feet
- Bending Over to Touch Floor
- Getting Off Knees
- Hanging from Horizontal Bar
- Walking Board (Buford Johnson) (35)
- Jumping from Floor
- Jumping from One Step

### TESTS RETAINED

Thirty-eight<sup>1</sup> of these tests seemed promising for use as tests with preschool children and, in the light of the experience gained from this preliminary study, were reorganized for standardization on a large group of children. The tests were selected as those which were most popular with the children who attempted them; as those which seemed best to discriminate between children who by other criteria appeared bright or dull; as those which seemed selective of the factor of growth of mental ability, discriminating between the ability of older children and that of younger children; and as those which were the most practical from the point of view of test administration. It is from this selected list of tests that the scale developed in the Merrill-Palmer study was organized. These tests are described fully in the next few chapters.

### TESTS ELIMINATED

Several tests which on the whole seemed most promising were discarded because of certain unfavorable aspects. An

<sup>1</sup>Three tests were standardized from the Buttons and Buttonholes indicated as a single item under the Decroly Educative Games listed above; accordingly, though the items marked with asterisks in this list number only thirty-six, the list of tests derived from them numbers thirty-eight.

analysis of such individual tests and the reasons for excluding them follows.

**Pintner-Paterson series.** The Pintner-Paterson test series (51), which extends at its lowest age group to 5-year-old children, includes a few tests that were considered suitable, perhaps with some modification, to children under 5. In addition to the Seguin Form Board, the Mare and Foal Test, and the Manikin, the following two tests of the Pintner-Paterson series were studied but were finally discarded.

*Triangle Test.* Only nine children out of twenty-five who were given this test were able to do it. The ages of the successful ones varied from 41 to 59 months. While there was a slight tendency for the older children to succeed more frequently, results were neither consistent nor promising enough to warrant further study. Moreover, the test was decidedly unpopular with and lacking in interest for preschool children.

*Knox Cube Test.* Two children, aged 55 and 58 months, were able to make scores of 6 and 7, respectively, on this test. No others out of the twenty-four tested succeeded in more than three of the number arrays. Five children failed to score one point, seven made a score of 1, six a score of 2, and four a score of 3. While all five of the failures were made by children less than 48 months of age, the slight variation in the scores of the other group made it unpromising as a test. No attempt was made to simplify this series, as Kuhlmann has simplified it in his scale.

*Jeux Educatifs tests.* The first series of *Jeux Educatifs* by Decroly seemed to be promising as test material. Eleven of these games were tried with the Merrill-Palmer children. Only two of these were retained as tests — the Lotto of Forms, called in the test series "The Decroly Matching Game," and the series of button strips, from which the one-, two-,

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and four-button strips were taken. The other nine of these games, together with the button strips rejected after trial, yielded the following results:

*Lotto of Colors.* Sixteen stars of different colors, on large cards, were to be matched by sixteen similar stars on small cards. A few of the brighter children made fairly good scores on this test. Only one of them placed all sixteen correctly. The time required for those placing eight or more varied from 121 to 735 seconds. Results seemed to indicate that this might be a satisfactory test for children 60 months old, but it was not included in the present standardization.

*Lotto of Tints.* Flag silhouettes of different tints were to be matched by similar flags on small cards. This proved to be even more difficult than the Lotto of Colors.

*Lotto of Two Colors.* A man catching a ball was the basal picture. There were sixteen different color combinations. The men were of one solid color and the balls were of another color. Both the men and the balls had to be matched for a success. None of the children could match more than eight out of the sixteen, and the test did not seem to indicate much difference between the younger and the older children. The task was so difficult that there was a decided tendency toward loss of interest.

*Lotto of Positions.* This lotto game consisted of matching pictures of sixteen athletes colored blue and standing in different positions. There were very few children who were able to do this test at all, and the highest score made was nine correct placings out of a possible sixteen.

*Lotto of Color and Position.* Two cards, each containing twelve silhouetted Dutch shoes of different colors, formed the material for this test. Six shoes on each card were facing right, and six left. The problem here was to match both color and position. The task seemed to appeal to the children, but they failed to get the idea of matching the

position. If the shoe was facing in the wrong direction, they either let it remain in that position without comment or turned the shoe upside down so that the toes pointed in the same direction. One child matched twenty of the twenty-four shoes, but the majority failed to match more than ten, and these correct matchings appeared to be largely accidental as far as correct position was concerned. For some reason it seemed easier to match the differently colored shoes than to match the differently colored stars.

*Lotto of Sizes and Colors.* Four silhouette objects, each of three sizes and in three different colors, were to be matched. While this proved to be interesting, it was much too involved and too time-consuming to be promising as a test for young children.

*Game of Geometrical Figures.* This game consisted of four form boards, one in which ovals of different sizes were to be replaced, and three in which squares, triangles, and circles, respectively, were to be replaced. This test might have proved satisfactory for the 30 to 35 and 36 to 41 month groups. It proved to be too easy for the 48 to 53 month group.

*Discrimination of Thickness.* Six wooden planks, all 5.7 centimeters wide by 9 centimeters long, two of them 7 millimeters, two 5 millimeters, and two 3 millimeters thick, formed the material for this test. Various methods were used to secure judgments of the thickness of the planks, but none was devised which made it an interesting task for the children.

*Buttons and Buttonholes.* The test material consisted of five sets of cotton flannel strips with buttons and buttonholes. The strips contained differing numbers of buttons, ranging from one to five. The one-button strip was presented first, then the two-button strip, the three-button strip, and so forth. Time was taken for the buttoning of each strip.



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There was a practice effect noticeable in the last strips. The relative time required for these decreased rapidly. In most cases it took very little more time for the child to button five buttons than three. Since the time scores seemed promising measures of development and the task had a surprising degree of fascination for young children, it was retained for standardization. The test was comparatively long with all five strips, so the three- and five-button strips were discarded as contributing little beyond what was given by the two- and four-button strips.

*Identification of Number.* Large cards, containing various numbers of silhouetted forks in different arrangements, were to be matched by smaller cards. This was a difficult task for these young children, and very few succeeded in matching more than the one- and two-fork arrangements. Judging from the results obtained from this group, it seems probable that the test would be more suitable for children of 5 or 6 years of age.

**Kent-Rosanoff Free Association Test.** The free association test of one hundred common words devised by Kent and Rosanoff (36, 54) has been used for children as young as 4 years of age. It was found to be usable with Merrill-Palmer children of 48 months of age and over when modifications were made in the method of administration. Many of the words were unknown to the children, and one could not be sure whether delayed responses were occasioned by this or some other cause. The task was much too long, and it was lacking in objective elements that add interest. The experimentation with this test pointed to the possibility of interesting results from a simplified form more suited to these ages. The adaptation was not attempted in the present standardization.

**Porteus Maze Tests (52).** Dexterity in the use of the pencil has been utilized in various ways as a test. The

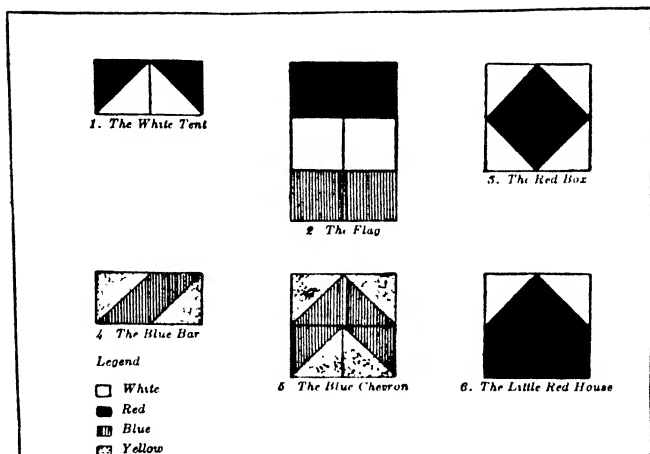


FIG. 1. Color-cube designs used as test material in preliminary study.

Porteus tests for the third and fourth years seem essentially this type of test, while those for and above the fifth year introduce the maze idea, which brings in new elements. Several of the Merrill-Palmer School group were unable to trace the cross of the fourth-year test without making more than three errors in each of the two trials, yet were able to go ahead successfully in the first two or three of the maze problems. As far as could be judged from the twenty-three cases studied, the maze portion of the test tended to differentiate the children on a personality rather than a developmental basis. Certainly the test as a whole did not seem promising for bringing out finely graded differences in the development of the preschool child.

**Color-Cube Designs.** The designs made from the color-cube blocks in the form devised by Kohs were too difficult for nursery school children (37). However, the idea of this test seemed so good that a simplified set of designs was used.

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Six simple designs were made of two, four, or six blocks. Three of these were to be copied and three to be reproduced from memory. Design 1, the white tent; Design 3, the red box; and Design 5, the blue chevron, were to be copied from a model of similar blocks constructed before the child. Design 2, the flag; Design 4, the blue bar; and Design 6, the little red house, were to be reproduced from memory. Practically all the children under 54 months of age failed the whole series. The blue bar and the red box seemed to be slightly easier than any of the rest. There was no apparent consistency in the results for those children who succeeded in doing some of the tasks correctly. It is possible that such a series might prove satisfactory with children of 60 months, but it was discarded as a possible test for younger children.

**Ink Blot Test.** The series of twenty ink blots described by Whipple in his *Manual of Mental and Physical Tests* (75) was given to a number of the children. The series was too long for some of the younger children, and a tendency toward a stereotyped response was apparent on the last blots. Most of the children were sufficiently interested in the task to respond to the various black splotches in a delightfully imaginative way. There was some tendency toward agreement as to what the various blots were. The test did not seem to differentiate well between the older and the younger children, or between the brighter and the duller ones.

Ink Blot No. 1 was called, in varying degrees of detail :

An old witch.

An old mother witch.

A witch; she's flying right on her broom.

A man and a little girl behind him and has a little candle and his feet sticking out behind him and a girl holding a chicken.

A girl and a little boy, and a girl holding a chicken.

That's funny, isn't it? It looks like a pillow. No, it's a little dolly, and it's her mother.

A colored lady and a colored little boy.

Ink Blot No. 7 seemed to give the idea of some kind of animal to most of the children. It was :

A goose.

A crab.

A birdie.

A little girl riding on a pussy cat.

A horse ; no, that is a cow, because I can see the foots.

Three foots.

A lion.

A beetle.

No. 8 was called :

A head hanging on four legs but putting sticks out on both his hands.

A little girl that's playing upside down and has sticks in both her hands.

A man. He has two sticks in his hand.

A man with two sticks.

A woman playing a drum.

A man and some leaves.

No. 10 was described in more or less picturesque terms as a human figure holding out a hand :

A man putting his two fingers out.

A man. This one is trying to catch this.

A little girl's hand. She has it out like this [illustrating].

Oh, it's some fingers. A man with a funny face.

A black hand [laughs]. Must be a bugger what steals people's money. It looks like that.

On No. 17 there was not so much agreement, except that the idea of some liquid's being spilled predominated :

A pail of water — spilling out water.

A sprinkler. Just part of a sprinkler. You could not take the whole picture, could you?

A cat. He's been in the water, and now he's all wet.

A lady washing, and she spilled some water, didn't she?

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The younger children tended to become fatigued more readily than the older ones, but otherwise they differed little from the older ones in their answers. Personality differences were often apparent in this test.

**Picture puzzles.** A series of eleven picture puzzles of the jig-saw type was given to the children. The first three of these were chosen for further standardization, although several of the others were interesting and would have done very well as tests. These puzzles varied in complexity from two to seven pieces. A few general observations made from this study are perhaps worth recording:

1. Young children use form chiefly as a guide in putting the puzzles together, paying little attention to the details of the pictures, although they often get an idea of what the picture is about before it is fitted together. In many instances, however, the picture serves the child as a criterion of a successful performance.
2. Irregular shapes are much easier than straight or slightly curved lines.
3. The larger the number of pieces, the more difficult is the puzzle.
4. Two puzzles having the same number of pieces vary in difficulty according to the shape of the pieces.
5. Interest in this type of test is high. Children remember the puzzles and ask for them from time to time when brought back to the examining room.
6. Differences in perseverance are strikingly brought out. Some children, though irritated by failure, worked for long periods — one child for 1650 seconds — before they gave up, while others refused to work for more than two or three minutes.
7. Five-, six-, and seven-piece puzzles are too difficult for most children under 5 at first presentation, though

they are not too difficult for occupational material where repeated opportunities are given for mastering the problem.

**Construction puzzles.** A wooden train from Schoenhut furnished the material for a test of constructive ability. The open freight car and the coal car were presented separately as Cart One and Cart Two. The child was first shown Cart One constructed correctly and was allowed to play with it a short time. Attention was called to the wheels and how they went around, to the wagon bed and to the sides, and even to the steering wheel at the front. Then the cart was slowly taken apart, and mention was made of each step. The pieces were then scattered over the table, and the child was asked to construct the cart again. The right and wrong moves were recorded with the time required for the performance. Twenty was the maximum number of correct moves possible. Four of the eighteen children tested were able to reconstruct this cart perfectly; six others made fourteen or more correct moves. The smallest number correct was three, the rest all scoring seven or more correct moves. The number of wrong moves varied from two to thirty-four. Two of the children who made perfect scores made only two wrong moves, while another one made eighteen. The test revealed interesting differences in the ability of the various children. The chief objection to the test was the extremely long time required to give it. The shortest time taken was 182 seconds. The children maintained an attitude of interested effort through a surprisingly long period. The task seemed excellent for bringing out a variety of personality tendencies. One interesting reaction was the tendency to decide to make something else when the task proved too difficult. The following record of a child's performance illustrates this tendency:

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"Is this the thing the people sit on?" the child asked and, looking hard at the wagon bed, continued, "Which side do the people sit on?" She did not get the complete idea of the grooves in which the sides of the wagon slipped. She worked on the task for a short time and then began turning over the pieces aimlessly. "Oh, gee, it's so hard to get this old cart fixed," she said, "I guess we will have to leave it up like this and make a door [holding up the wagon bed]. Here's going to be a big track [laying in a row the rods on which the wheels revolved]. This [turning the wagon bed over with the end pieces attached] is going to be a viaduct." She tried to put the large rods for the wheels through small round openings in the wagon bed. "Which hole does this go in, I wonder? See, this is something on the viaduct," she said, as she put the two small guide wheels on the wrong side of the wagon bed. "They go in somehow; they have to have bigger holes. This is going to be a train now." She played with the pieces as a train for a time and then was persuaded to go on with her original task. She had forgotten about the pieces that were necessary for the satisfactory placing of the wheels. "Where's the holes to fit these?" she kept asking, holding up the large rods on which the wheels were supposed to revolve. She finally gave up in 472 seconds after making seven out of twenty correct moves.

Construction Cart Two was presented after Cart One. It was not shown put together. The loose pieces were spread on the table, and the child was told that they would make a different kind of little cart. The time and right and wrong moves were recorded as for Cart One. No child put Cart Two together perfectly, but all who attempted it made a fairly successful cart. The time required was much shorter than for Cart One, ranging from 156 to 520 seconds. With this small sampling, there was no apparent sex difference in the ability to construct these two carts at the preschool age. While these two tasks seemed to have some value as tests, they were so time-consuming that they were discarded as unpractical.

**Nail Driving.** Six-penny nails were to be driven with a hammer of medium size into a block of white pine wood

3 $\frac{3}{4}$  by 5 $\frac{1}{4}$  by 8 $\frac{1}{2}$  inches. Most of the children 48 months old or over could do this task and enjoyed it thoroughly. The examiner recorded the number of strokes needed to drive the nail all the way down. The number varied from 62 to 490. The larger the number of strokes, the weaker was the individual stroke and the greater the number of miss strokes. As a rule the boys seemed to do better than the girls. This performance had great fascination for the children. It also seemed to differentiate the children in some degree, but the material offered such serious difficulties in standardization that the test was discarded.

**Taking Out Screws.** Three-fourths-inch screws were screwed into a white pine block. One screw was removed to demonstrate the method, and the child was given a screw driver and was asked to remove another screw. No screw was used more than once and each was screwed into a new hole. This task also seemed to appeal to the children, and they worked for long periods endeavoring to take out the screw. The task was too difficult for the younger 4-year-olds, but the older ones were usually successful. It was difficult not only to keep the screw driver in the groove in the screw head but also to remember which way to turn it. The usual reaction was to get the screw part way out, then to forget and screw it all the way in again before the error was noticed. One child of 4 years 3 months succeeded in removing two screws in 128 seconds, and another child of 4 years 10 months removed one in 71 seconds, but these time records were unusually short. The others took from 169 to 681 seconds to remove one screw. Because of the time consumed in the performance of this task and the difficulties in standardizing the material, the test was omitted from the final series.

**Walking Board.** The walking board used by Dr. Buford Johnson was tried with a number of children (35). Only one 2-year-old child was found who could walk on it. Older



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children usually could do it with varying degrees of excellence. The difference in performance proved to be difficult to state quantitatively, though the test has promising diagnostic elements.

**Physical culture tests.** A number of tests dealing with the handling of the body in various physical feats were tried — bending over to touch the floor, getting up off the knees to a standing posture, jumping from the floor when standing, and jumping from a step. Tests of this type seemed especially likely to call forth negative reactions. They were uninteresting to the children and tended to make them self-conscious. They were therefore discarded as unsuitable.

Other tests involving coördinated movements performed in imitation of the examiner were the following:

*Movement Imitation.* (1) Simultaneously touching right ear with right hand and chin with left hand. (2) Touching right eye with right hand and left shoulder with left hand. (3) Touching nose with right hand and mouth with left hand. At least two out of three of these tasks were done by 4-year-old children, but without enthusiasm. The tests were not tried with younger children. Because of the children's very definite lack of interest, these tests were discarded as of little value.

*Clapping Imitation.* The following directions were given: "Let me see if you can do these exercises. Watch me carefully, and when I am through see if you can do just exactly what I do." Five series of clapping sequences were given. If the child started to repeat the motions of any sequence before the examiner had completed them all, he was told, "No, wait until I am through," and was scored as if he had not tried before. The series were as follows:<sup>1</sup>

<sup>1</sup> Abbreviations used: o for over the head; u for under, below the knees; f for front, arms straight out; and b for back, arms extended in back. The child stands while he does this test.

## SERIES I

1. Clap f.
2. Clap o.
3. Clap u.
4. Clap b.

## SERIES II

1. Clap f, then o.
2. Clap u, then o.
3. Clap f, then b.
4. Clap u, then b.

## SERIES III

1. Clap o-u-o.
2. Clap f-b-f.
3. Clap f-o-f.
4. Clap b-o-b.

## SERIES IV

1. Clap o-u-b.
2. Clap o-b-f.
3. Clap f-u-o.
4. Clap u-b-o.

## SERIES V

1. Clap o-u-b-o.
2. Clap f-b-o-u.
3. Clap o-b-u-b.
4. Clap u-f-o-f.

This test was given to children as young as 42 months of age. Most children under 48 months could do no more than part of Series II. Children between 48 and 54 months of age could do part of Series III, and children from 54 to 60 months were able in most cases to do some of Series IV. Series V was much too difficult for preschool children. In spite of real diagnostic possibilities, the test was discarded because of its lack of appeal for the children.

**Summary.** Such is the group of tests discarded as being unsuitable for the present scale of tests for children under 5 years of age. Several of the tests were omitted because, in spite of their obvious possibilities with older children, they were too difficult for preschool children; some were omitted because they were too time-consuming and would so fatigue the child that he could not be given other tests; others were too difficult to score or to administer; and others were so lacking in interest for the preschool child as to be of no value.

The tests retained for further study after this preliminary try-out on the Merrill-Palmer School children were then carefully revised and reorganized. The exact method of administering these tests, including the method of presentation, the number of trials, and the form of the records taken at the time of the performance, was carefully prescribed; and the stage was all set for the standardization of the tests.

## CHAPTER FIVE

### STANDARDIZATION OF THE SCALE

THE problem to be met after the preliminary study in the Merrill-Palmer research had resulted in the selection of thirty-eight tests for standardization was the obtaining of children in sufficiently large numbers and from a sufficient variety of sources to insure an adequate standardization.

**Sources from which the children were obtained.** Obtaining an unselected group of children of preschool age is a difficult task in a community where there is no single organization through which all types of children can be reached. Even when the children are selected from a large variety of sources, one does not always know what artificial selective factors may be at work.

In the present standardization care was taken to see that the children from each of the various sources represented as far as possible an even distribution according to sex and age range. Though 677 children were tested for the standardization, 46 of these were excluded from the final norms for various reasons. Accordingly, the final norms represent a total of 631 cases, 300 boys and 331 girls, ranging in age from 18 to 77 months. The children were obtained from twenty different sources, which have been classified into four groups according to type, as shown in Table 2.

It was hoped that with so large a number of cases and so many types of children represented in the norms, the results would give a valid picture of the ability of the preschool child. It was considered inadvisable to use the test results from the children attending the Merrill-Palmer nursery school in the standardization. The environment surrounding these children is so enriched that a few months' attendance in the school is sufficient to alter markedly the standing of the children on tests already standardized. It does not

TABLE 2

CLASSIFICATION OF SOURCES FROM WHICH CHILDREN WERE OBTAINED FOR  
THE STANDARDIZATION OF THE TESTS

SOURCE <sup>1</sup>	TOTAL NUMBER	PERCENTAGE
Waiting-list group . . . . .	229	33
Merrill-Palmer School waiting list		
Friends of children on waiting list		
School group . . . . .	241	36
Public schools (18 to 77 months)		
Balch School		
Burton School		
Columbian School		
Monteith School		
Thirkell School		
Private schools (kindergarten children only)		
Liggett School		
Newman School		
Child-care agency group . . . . .	128	19
Children's Aid Society		
Franklin Street Settlement		
German Protestant Orphanage		
Protestant Orphanage		
St. Vincent de Paul Society		
Sophie Wright Day Nursery		
Tau Beta Day Nursery		
United Jewish Charities		
Health clinic group . . . . .	79	12
Merrill-Palmer Consultation Center		
Michigan Health Show		
Red Cross Baby Clinic, Bellefonte, Penn- sylvania		
Total	677 <sup>2</sup>	100

<sup>1</sup>Except where otherwise indicated, all the children were obtained through groups in Detroit.

<sup>2</sup>Of these cases 46 were excluded from the final norms because of complete refusals, incomplete examinations, and other irregularities.

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represent the environment of the average child in the home, where parents have neither the money, energy, nor space to provide the equipment that makes for well-rounded play and, if they realize the necessity of providing adequate supervision of the child's health and nutrition, often lack a knowledge of ways of accomplishing it; and where, at best, the child has only one or two playmates of his own age to stimulate his self-reliance and to socialize his emotions.

A fruitful source of supply was the waiting list of the school, which at the time of standardizing the test numbered about four hundred. The children of the waiting list, like those attending the nursery school, represent a class of homes somewhat above the average. The mere fact that the parents are interested in having their children attend the school is selective of a better type of home than the average, and one suspects that the coöperation of the parents in bringing their children in for a mental test is a further selective element, since only 150 of the children on the waiting list were brought to the school for that purpose. Several mothers sent in the young children of their friends to be tested — a group representing about the same social level as the waiting-list group.

The group obtained from the public schools included kindergarten and first-grade children of 60 to 78 months of age, and children under 60 months of age brought in by the older school children. The preschool children of this group were made available through the coöperation of the school principals and their assistants, who canvassed the grades for volunteers to bring in young children and scheduled times for them to be tested. Since the majority of the schools were in districts where the parents of the children were tradesmen or factory workers, living for the most part in small flats or "light housekeeping" rooms, and the Psychological Clinic of the Detroit Public Schools had

found that the children in the schools tended to be distributed fairly evenly around average in mental ability, as shown by the group tests, it was considered safe to assume that the preschool children of the same group also represented an approximately average group.

To offset the group of children of the Merrill-Palmer waiting list and the group from the kindergartens of two private schools, who were thought to be somewhat superior, an effort was made to obtain a number of children from inferior environments. This group included children from orphanages, day nurseries, and child-care agencies.

A smaller group of children was obtained through health clinics. A Baby Health Contest, held under the auspices of the Michigan Health Show, furnished a number of children, most of whom were under 36 months of age; the Red Cross Baby Clinic at Bellefonte, Pennsylvania, provided several children under 24 months of age; and the Merrill-Palmer Consultation Center, which may be classified as a health clinic including both physical and mental health in its program, supplied thirty-five children.

**The examiners.** The examiners were carefully trained graduate students in psychology, who had first practiced giving the tests to nursery school and kindergarten children, and who had learned how to manage young children through experience in the nursery school. The greater part of the testing was done by three examiners — Miss Ethel Gibson, Mrs. Elizabeth G. Anderson, and the writer. Other examiners were Miss Ruth L. McMillen, Mrs. Lulu R. Lancaster, Miss Marion Monroe, Miss Evelyn Eastman, and Miss Elizabeth Dealey.

**Conditions of the examination.**<sup>1</sup> The examinations were given in rooms so arranged that the examiner was alone with the child, or with the parent and child when it was neces-

<sup>1</sup> Directions for administering the test are given in Part Three of this book.

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sary to admit the parent. An effort was made to prevent any interruption during the course of the test. The rooms were cleared as far as possible of objects that might tend to distract the child from the test material; toys, dolls, balls, and boxes, other than those used in the examination, were removed from sight.

The child was seated at a small, low table in a chair high enough to give him free use of his arms above the top of the table. The examiner sat at the same table, facing the child. At all times the comfort and ease of the child were considered above everything else. The child's chair was placed to give him the best light on his work. He was taken to the toilet if he displayed any restlessness that indicated such a need. The tests were made chiefly in the morning from nine to twelve o'clock. One hour was allowed for each examination, though the actual time taken depended upon the individual child and was usually not over forty-five minutes. Some time had always to be taken to establish proper rapport between the examiner and the child. With children of 54 months and over, the examination seldom took longer than thirty minutes.

The decision as to whether the parent was to be admitted to the examining room depended somewhat upon the age and response of the child. With children of the 18 to 23 and the 24 to 29 month groups, it was usually necessary to admit the parent, though in many instances children of these ages were willing to go to the examining room alone. Whenever the parent could be dispensed with, the result was much more satisfactory. The attitude of the young child toward his parent was the determining factor in deciding whether or not separation was advisable. Often in cases where the child had been cared for chiefly by the mother, separation from her was too great a break to permit of a satisfactory emotional attitude during the examination.

In the case of children of 30 months or more the parent was excluded if possible. At this age children begin to show indications of a self-consciousness in the presence of their parents which prevents the most effective response in the test situation. Even at 30 months, however, some children were still so dependent upon their parents that it was impossible to exclude them without bringing on a tantrum, which is to be avoided if possible.

With children of 36 months it was practically always found best to exclude the parent. By this time the child has developed self-consciousness in the presence of the parent to so pronounced a degree that the results are seriously altered if the parent is admitted. Given a small table filled with interesting-looking objects which the child is told are games and an examiner skilled in developing the child's interest in this material, the child of 36 months or more will usually respond naturally to the test situation. Children of this age who were brought into the examining room protesting violently at being separated from their parents began to coöperate with enthusiasm in "playing the games" once the door was shut and their attention diverted to the test objects. Interest in the new is too overwhelming at this age for a tantrum to last long.

Occasionally tantrums occurred in the middle of the examination. Suddenly, almost without warning, the child would knock the test material to the floor and burst out crying. These tantrums were found to be occasioned by the child's losing patience with his task; they did not occur when the test was running smoothly. Careful observation, to avoid urging the child beyond the danger line of impatience, usually prevented their occurrence. The treatment of necessity varied with the child. Often it was found best to ignore the affair and bring on some other test that was interesting and comparatively easy. In other cases the child was asked to



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pick up the scattered test material and put it in its box. In the few cases in which kind or soothing treatment proved ineffectual, isolation for a short time was often effective. In some instances the testing was not resumed after such an emotional upset, but the parent was asked to bring the child in at a later date. Sometimes the child was really eager to do the tests and responded satisfactorily after this brief "flare-up." The following note indicates a fairly typical case of a tantrum in an older child: "This child had a frightful tantrum, threw himself on the floor, beating his head, screaming, and kicking the examiner before settling down. When he did begin, he insisted upon sitting on the examiner's lap. Then, in a few minutes, he sat on his own chair and was the most coöperative, interesting child imaginable."

There are other reasons for excluding parents and relatives from the examining room whenever practicable. In some cases test results had to be discarded because parents would not refrain from suggesting the satisfactory response to the child. Further, most parents are not familiar with the technique of testing and often feel that their children have not had a fair chance. The examiner's suggestions of ways that may help to improve weak points in the child's development are often rendered ineffective by this feeling. If the parent is not admitted to the examining room, these difficulties are eliminated.

An effort was made to give the examination as much of an atmosphere of pleasure and play as possible. The tests were always referred to as toys or games. They were concealed from the child in attractive colored boxes, one box to each test. The child readily took the suggestions of "surprises" and "very special games," and did not feel at all let down by the disclosure of a few colored cubes or some strips of buttons and buttonholes in a box whose contents

he had eagerly demanded to see. As long as the examiner was able to maintain an attitude of delight and interest in the tests, there was no difficulty in inducing it in the child. There was something alluring to the child in the gayly colored boxes. His curiosity was instantly whetted, and interest was easily maintained. It was usually as difficult to persuade the child to leave the tests as to persuade him to go to them in the first place.

A further element of interest to the child was the appeal of having the undivided attention of an appreciative and understanding adult, who gave the impression of playing games and whose demands were all couched as suggestions. The child was often permitted to choose the next box to be opened, and if he asked to look in a certain box that happened to appeal to him, he was usually permitted to do so. In cases where the child had not completed the task already begun, the desire to look in some other especially chosen box was used as an incentive for continued effort.

The amount of praise given for the performance depended upon the personality and age of the child. As a rule, older children need a lesser amount of praise than do younger ones. It was always safe to leave the child with as little sense of failure as possible in case he failed, and to encourage him to the point of continued, interested effort, but not to the point where he became cocksure and began to show off. Children over 36 months of age were as a rule more attentive, and tended more to do what was requested without delay, than were the younger ones. It was necessary to give the younger child a chance to investigate the material presented and to carry out a slight initial performance according to his own desires before he was willing to adjust himself to the conditions of the test.

Constant activity on the part of the child was essential to his continued attention and interest. When the test

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had been completed, the child was given the privilege of helping to replace the toys in the boxes. The children were easily bored by tests containing no performance elements and did not hesitate to show it. No rushing or speeding was effective. In many instances the younger children did not grasp the idea of haste, and many of the older ones who did grasp it either resented it or were much upset by it. The child's spontaneity was encouraged in every way, for it is desirable that the child feel as natural and unrepressed as possible in the test situation.

The younger the child, the more were the conditions of the test adapted to his mood. There was no regular order of tests. Some rules were always adhered to, however, in presenting the tasks. A test that had great intrinsic appeal and was relatively easy according to the age of the child was presented first. For the older children the Little Pink Tower was a suitable first test. Even those who failed always thought it satisfactory, and this left a feeling of successful accomplishment and a desire to attempt new tasks. For children under 36 months either the Wallin Peg Board A or the Sixteen-Cubes Test was good as an opening task. Once in rapport with the child, the examiner could present tests in any order, choosing favorable times for tasks most likely to produce negative reactions. The Seguin Form Board was always presented earlier in the series than the Mare and Foal Test. There was some evidence of a practice effect in these tests, and the order was strictly adhered to.

Careful timing was, of course, an essential. Time was always taken out in case of interruptions. The rule in timing was to start the watch the instant the child started the imposed task. Often it was necessary to answer questions about the objects or to allow the child a brief period of inspection before he actually began the requested task.

Children as young as the ones examined in this study

seldom worked for long periods on a task that was hopelessly too difficult for them. Some degree of success was necessary to maintain the child's interest in a test. Continued encouragement helped, but a child who was failing hopelessly on a picture puzzle or other task that was self-corrective soon realized his plight and refused to go on. As a rule the child who failed in tests that were not self-corrective did not realize his failure but continued to work at the task until he thought it completed. The realization of failure varied with children of different ages and with the different tests. Some children apparently did not realize their failure in tests as self-corrective in nature as the Mare and Foal or the Nest of Cubes; in such cases, the child had not grasped the conditions of the test well enough to discover that it was self-corrective.

## CHAPTER SIX

### STATISTICAL EVALUATION OF RESULTS

#### CLASSIFICATION INTO AGE GROUPS

THE children were classified into age groups of six-month intervals, beginning at 18 months and extending to 77 months. The aim in selecting cases was to have at least fifty for each age group. Table 3, "Distribution of Cases According to Age," indicates to what extent this was accomplished. The table includes only the children represented in the final norms. A smaller number than fifty cases for each age group seemed inadequate for purposes of standardization. The requirement of at least fifty cases in each age group resulted in the adoption of a six-month interval rather than a smaller one. Ideally, the standardization should have been made on the basis of one- or two-month intervals, since at every age in the preschool period chronological age is a decisive factor in the performance. This factor was so pronounced in a preliminary analysis by year intervals that a reclassification by six-month intervals was necessary. However, a classification into smaller than six-month intervals would have required so large a number of additional cases that it was unwarranted at this time.

The age of the child was determined to the nearest month. Any number of days over fifteen was considered an additional month. Accordingly, the 18 to 23 month group includes all children whose ages are between 17 months 16 days and 23 months 15 days, inclusive; the 24 to 29 month group includes those whose ages fall between 23 months 16 days and 29 months 15 days, inclusive; and so on, up to the age group 72 to 77 months, which includes children whose ages are between 71 months 16 days and 77 months 15 days, inclusive.

TABLE 3  
DISTRIBUTION OF CASES ACCORDING TO AGE

AGE GROUP (Months)	NUMBER OF CHILDREN
17.5-23.4	57
23.5-29.4	67
29.5-35.4	81
35.5-41.4	69
41.5-47.4	59
47.5-53.4	59
53.5-59.4	61
59.5-65.4	60
65.5-71.4	69
71.5-77.4	49
Total	631

All test results that were thought to be in any way atypical were omitted from the standardization. The test results of defective children were omitted, as were those of the few exceedingly superior children found. Other irregularities resulting in the omission of test results were the refusal of all the tests or of so many that no final score could be given; a continuation of the emotional upset, or fatigue, when the child had had a severe tantrum before settling down to the test; and unfavorable reactions caused by the presence of a third person in the room, undue distraction, and the like. In all, forty-six cases, scattered throughout the age range, were omitted.

Table 4 presents an analysis of the distribution of children who were given the various tests, exclusive of refusals. The number of children who were given any one test varied somewhat with the age groups. Several factors entered into this variation. The list of tests was too long to give every test to every child; consequently, if a test was performed successfully by all the children of an age group, or if

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it was so difficult that all the children of the group failed in it, it was discontinued after a fair trial as unsuitable for children of that age. Another factor in the variation was the fluctuation in the number of refusals.

### TWO TYPES OF TEST ELEMENTS

**Variable-score tests.** In standardizing the series of tests, two types of test elements were distinguished. The one type represented test elements that could be given a variable score, such as the time required for success, or the number of errors made before the test was correctly completed. These test elements were termed *variable-score* tests.

**All-or-none tests.** In the other type of test elements no time or error score was possible. The child either succeeded in the test or he failed. There was no objective way of evaluating slight differences in performance. These test elements were termed *all-or-none* tests.

### THE PREVIOUSLY PUBLISHED DECILE TABLES

The statistical organization of a group of unrelated tests, like those of the present series, is a long and laborious process. There was, however, an immediate need for the tests, and accordingly decile tables for each half-year age group were compiled on all tests that could be made to fit into this type of evaluation, to serve until something better could be made available. In determining the final score, the child's score on each test was read into a decile standing, and these several standings were then ranked and the median decile score was used as an index of the child's standing in relation to all other children of the same age group. These decile tables, which are no longer used, were printed in the preliminary report of the present study (61) and will not be reprinted here.

TABLE 4. DISTRIBUTION OF CHILDREN GIVEN THE VARIOUS TESTS,  
EXCLUSIVE OF REFUSALS<sup>1</sup>

TEST	AGE GROUP (Months)									
	18-23	24-29	30-35	36-41	42-47	48-53	54-59	60-65	66-71	
Commands . . . .	53	43	47							
Throwing Ball . . .	52	62	[56]			...				
Straight Tower . . .	53	67	[50]			...				
Questions . . . .	53	50	57							
Peg Board A . . . .	50	52	58	25						
Peg Board B . . . .	47	51	57	25						
Walking Block . . .	29	37								
Crossing Feet . . . .	20	34								
Sixteen Cubes . . . .	53	69	69							
Repetition of Words	51	51	55							
Standing on One Foot	42	35								
Folding Paper . . . .	48	49	53							
Identification of Self	46	48	50							
Drawing Up String .	47	51	53							
Nest of Cubes . . . .	52	55	58							
Cutting with Scissors	49	52	58							
Word Groups . . . .	50	49	50							
One Button . . . .	[54]	57	57							
Two Buttons . . . .	[59]	71	84	73	56	59	55	59	83	
Four Buttons . . . .	[54]	[65]	[55]	62	57	59	55	59	69	
Matching Colors . . .	[49]	54	58	30		...				
Seguin Form Board .	[7]	[28]	85	73	57	60	57	57	83	
Three-Cube Pyramid	[8]	[26]	80	72	57	59	[56]	[59]	[69]	
Six-Cube Pyramid .	[8]	[26]	[19]	69	56	58	56	59	67	
Action Agent . . . .	[7]	[26]	72	72	56	55	56	58	83	
Fist and Thumb . . .	...	46	30	24	[27]	...				
Counting Two Blocks	46	46	49							
Copying Circle . . .	[7]	70	77	72	54	55	52	51	55	
Copying Cross . . . .	[7]	[9]	[15]	60	53	56	53	51	67	
Copying Star . . . .	[7]	[9]	[15]	[60]	54	55	54	51	67	
Picture Puzzle No. 1	[8]	[27]	77	68	58	60	56	58	69	
Picture Puzzle No. 2	[8]	[25]	[20]	[37]	56	54	55	59	69	
Picture Puzzle No. 3	[8]	[25]	[22]	[37]	[45]	58	49	59	69	
Little Pink Tower .	[8]	[28]	79	69	55	57	57	59	82	
Mare and Foal . . .	[7]	[21]	[24]	68	53	58	58	59	84	
Decroly Matching										
Game . . . .	[6]	[8]	[15]	[32]	28	58	55	59	80	
Manikin . . . .	[6]	[9]	[15]	[34]	52	59	56	55	81	
Opposition of Thumb and Fingers . . .	[7]	[14]	56	45	51	51	[26]	[42]	[79]	

<sup>1</sup> The figures in brackets represent frequencies not included in the norms.



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The decile method of evaluation proved seriously deficient. Though the deciles were based upon age groups of only six-month intervals, the correlation between the standing on the test and the age of the child was so high within each six-month age range, especially at the younger age levels, that the value of the score as a measure of ability was greatly reduced. Further analysis of this somewhat crude method showed that it was impossible to compare the standings of children in the different age groups. Thus a decile score of 70 meant something quite different in the different age groups. The usefulness of the series was considerably lessened by these deficiencies in scoring.

It was necessary, therefore, to devise some method of making the scores comparable at the different ages and more dependable within the age groups themselves. Without comparable scores there was little possibility of predicting future performance. It was considered essential, also, to make a test scale that would utilize correct statistical procedures as far as possible, in order that the possibility of subjective errors in interpretation might be reduced to a minimum. Just what a given test score may mean, even when it is given on the basis of a carefully scaled test series, is uncertain enough. There are still possible as many interpretations of the score as there are individual examiners. Careful and adequate scaling, however, further postpones the necessity for subjective evaluation, which, ultimately, is inevitable.

### SOME PROBLEMS IN STANDARDIZATION

The organization of the group of standardized tests into an effective scale involved several distinct problems, as follows:

1. The combining of the seventeen all-or-none tests with the variable-score tests, for purposes of scoring the total

TABLE 5. MEDIAN SCORES FOR VARIABLE-SCORE TESTS

Test	Age Group (Months)									
	18-23	24-29	30-35	36-41	42-47	48-53	54-59	60-65	66-71	
Mare and Foal										
Time <sup>1</sup> . . . . .				316.7	208.5	150.0	92.6	85.8	83.1	
Errors . . . . .				18.8	8.8	6.4	6.1	5.3	4.9	
Seguin Form Board (Best trial)										
Time . . . . .			222.0	108.7	72.1	62.5	48.1	39.0	35.0	
Total errors . . . . .			2 suc.	28.1	9.3					
Decroly Matching Game										
Time for 12 right . . . . .							216.6	160.0	133.0	
Number right . . . . .					3	4				
Picture Puzzle No. 1 (Time)				13.5	6.1	3.9	3.3			
Picture Puzzle No. 2 (Time)						46.4	22.1	21.3	18.8	
Picture Puzzle No. 3 (Time)							49.1	47.6	42.5	
Three-Cube Pyramid (Time)			17.0	10.9	8.5	6.5	6.5	6.0		
Six-Cube Pyramid (Time)						35.0	20.0			
Manikin . . . . .		0	0	0	0	1.6	2.4	2.9		
Nest of Cubes (Time)		250	30							
Sixteen Cubes . . . . .										
Time for 16 right . . . . .		125	100.7							
Number in box . . . . .		16	16							
Wallin Peg Board A (Time)	13	24.6	20.0	17.1						
Wallin Peg Board B (Time)	37.5	41.3	26.8	22.5						
Questions . . . . .	1	6	7							
Little Pink Tower (Time)				32.5	21.5	17.2	13.7	10.2		
Two Buttons (Time)			170.0	49.6	34.2	29.6	22.5	18.9		
Four Buttons (Time)					76.3	50.5	41.9	39.1	36.3	
Action Agent . . . . .			6.0	9.7	11.7	13.4	13.8	16.4		
Repetition of Word Groups		9.8	13.1							
Repetition of Words	2	4								
Copying Star . . . . .							1	3		

<sup>1</sup> The time is recorded in seconds throughout the table.

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performance, was the first problem. The simplest way out of the difficulty was to reduce the variable-score tests to forms that could be given plus or minus scores. However, this method would have sacrificed the finer measure of the child's skill given by a time or error score and would have involved the loss of much valuable diagnostic information. For example, instead of saying that a particular child was able to do the Seguin Form Board in 75 seconds in the best of three trials, we should have to say simply that he was able to do the Seguin Form Board under the specified conditions and had passed the test. It was necessary, therefore, to evolve some method of combining the scores of the two types of tests so that the child's total performance might be evaluated.

2. The treatment of refusals was another problem. The preschool child is an individualist. He refuses to do a task unless it appeals to him. This is especially true of the younger children. Refusals to do the test do not necessarily imply inability to do them but often simply lack of interest in the test or an emotional inhibition against it. Provision had to be made, in the scoring of the test, for these refusals and for tests omitted because the child was too tired to warrant imposing them upon him.

3. A similar problem was occasioned by irregularities in the administration of the test; for instance, if the stop watch failed to register or an attending parent became too helpful and aided in the success of the performance, the test could not be scored in the usual way. To let the child either gain or lose by these slips would involve an error.

4. The uneven distribution of tests throughout the range of the series, with differing numbers of test elements in the various age groups, prevented the use of some of the earlier scaling devices and meant that a new method of scaling must be devised.

REDUCTION OF ALL TEST ELEMENTS TO AN ALL-OR-NONE  
BASIS OF SCORING

The first problem, then, was to devise a way of combining the scores of the two types of tests. The method used was as follows: First, the median score in the variable-score tests was determined for each age group (see Table 5, "Medians for Variable-Score Tests"). Each of these median scores was then taken as a *test element* and analyzed as to suitability for inclusion in the final scale. The criterion for this decision was the efficiency of the test element in question in differentiating the performance at the age level at which it functioned from the performances at all other age levels. The median in a test for a particular age group was discarded as of no value as a test element unless it was found to show a significant difference from the median for the age group below it. For example: The Three-Cube Pyramid was completed by the median child of all age groups from 30 to 35 months up. There was a striking decrease in time of performance with increase in age up to the 48 to 53 month age group. At this point the performance in 6.5 seconds is exactly the same as that for the 54 to 59 month age group. Consequently, the score 6.5 seconds (later called 7 seconds) was retained as the Three-Cube Pyramid test element for the 48 to 53 month age group, and the medians for the older age groups were dropped as not suitable for inclusion as test elements.

This method made it possible to consider the median score in the variable-score tests, at each age level, as an all-or-none test element, with the performance of the task at a level equal to or higher than the median at a given age level constituting the equivalent of passing an all-or-none test at that level.

In this way seventy-six all-or-none test elements were

TABLE 6  
PERCENTAGE PASSING ALL-OR-NONE TESTS

TEST	AGE GROUP (Months)								
	18-23	24-29	30-35	36-41	42-47	48-53	54-59	60-65	66-71
Commands . . . .	71	86	87	..	...	..	...	..	..
Throwing Ball . .	78	100	100	.		.	.	.	..
Walking Block . .	48	83		.	.	.		..	...
Folding Paper . . .	35	73	92	..		.	..	..	...
Crossing Feet . . .	47	79			.	.		...	...
Standing on One Foot	28	88		.	.			..	..
Straight Tower . .	71	100	100	..	.	..	.	..	...
Identification of Self in Mirror . . . .	28	67	70		.	.	..	...	.
Cutting with Scissors	10	37	83				.	..	..
Drawing Up String .	19	47	77					..	...
Fist and Thumb . .	0	0	39	83	87	88	..	..	...
Matching Colors . .	2	20	68	73			.	.	...
Counting Two Blocks	6	30	43	.	.			.	...
One Button . . . .	0	19	72	.	.	.		.	..
Copying Circle . . .	0	7	31	53	81	94	100	100	100
Thumb and Fingers .		0	21	35	50	86	96	96	100
Copying Cross . . .	0	0	0	10	49	48	87	100	96

made of the twenty variable-score tests. These, added to the original seventeen all-or-none tests (see Table 6), made a total of ninety-three separate diagnostic elements.

#### ACCURACY AND SPEED AS FACTORS IN SCORING

Several of the tests were scored in more than one way. Sometimes both time and error scores were recorded; sometimes both the number right and the time score were recorded. In these instances a careful evaluation of scoring methods was desirable in order to determine whether the one type of measure contributed diagnostic factors that the other did not contribute; and if so, whether both measures were of

equal value in the scale, and whether the differences in the factors they contributed were sufficient to warrant including both measures in the scale. If a high correlation between the two measures was apparent, there was the problem of determining which of the two measures was the more accurate and practical. The following tests required this type of analysis:

*Mare and Foal Test.* A study of the two measures in this test, the time for one trial and the number of errors, revealed that there was a marked correlation between the two at the younger age levels, but that it decreased to a negligible amount at the upper age levels, as follows:

AGE GROUP (Months)	CORRELATION (Product-Moment Formula)
36-41	$r = 0.752 \pm 0.045$
60-65	$r = 0.208 \pm 0.087$

It was decided to include only a time score for this test.

*Sequin Form Board.* Four measures were originally taken of the performance on this test: time for the first trial, time for the best trial, total time for three trials, and sum of errors for three trials. The time for the best trial seemed to be a better diagnostic measure of time than any of the other time measures, as judged by the median performances at different age levels, and the error score seemed empirically to make a contribution to an understanding of the child which a time score was likely to conceal. Had the error score been discarded as a measure, the fundamental distinction between the mental make-up of the slow-accurate child and that of the slow-inaccurate child, and between that of the fast-accurate child and that of the fast-inaccurate child, would have been missed. A study of the correlation between the time for the best trial and the total errors on all three trials gave the following results:

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AGE GROUP (Months)	CORRELATION (Product-Moment Formula)
42-47	$r = 0.564 \pm 0.069$
60-65	$r = 0.442 \pm 0.049$

These correlations were sufficiently low to warrant the inclusion of both scores in the test scale; however, the error scores offered so little differentiation at the higher age levels that they were discontinued at 48 months.

*Decroly Matching Game.* The results in this test were found to be evaluated best by giving a score of the number right for all performances in which less than twelve correct placements were made, and a time score for all those in which more than twelve correct placements were made.

*Sixteen Cubes.* The children of the 18 to 23 month group had great difficulty in placing the sixteen cubes in the box; only 35 per cent of them could place all sixteen. The number of blocks placed seemed to be a fair measure of the ability of the younger child; accordingly, the median number of blocks placed, which was 13, was used as a measure of success at this age level. Above 24 months the time score for placing all sixteen cubes in the box proved to be the better measure of performance.

*Cutting with Scissors.* While the ability to cut with scissors develops with striking rapidity, the test would have measured several stages in the development of this ability had it been carried on to the older age groups. It was standardized, however, only below 3 years. The number of children of nearly 3 years who could cut strips suggests that this ability probably appears normally at 3 years. However, only the ability to cut gashes or fringes in paper is considered in this standardization.

### CORRELATION BETWEEN THE SEPARATE TEST ELEMENTS

Upon examining a number of separate tests, one is impressed with their diagnostic range and value and with the

possibilities of combining them in various ways to achieve different diagnostic results. Although there is need for using the greatest variety of tests possible in order to get a complete picture of the child, there is always the possibility of duplication. To what extent are the individual tests contributing distinctive elements, and to what extent are they simply accentuating and giving additional weight to elements already adequately represented? A comparative study of all the separate tests would be necessary to answer these questions completely. In the present study so complete an analysis was impossible because of the time required; for the most part only those instances where the relationship seemed so striking as to challenge investigation could be studied.

The Mare and Foal Test and the Seguin Form Board seem to offer a striking possibility for duplication. It was found, however, that in 270 cases there was only a fairly low correlation between results on these tests ( $r = 0.458 \pm 0.032$ ). Further, in practice there are so many differentiating elements that it seemed worth while to include both tests in the series.

Wallin Peg Boards A and B, for fifty-three children from 24 to 29 months of age, had a correlation of  $r = 0.57 \pm 0.06$ , which, while fairly high, is low enough to warrant the inclusion of both tests. Further, Peg Board B is much more difficult than Peg Board A and differentiates well between children of 24 to 29 months and those below that age. The square pegs of Peg Board B require an added skill in wrist and hand which children under 24 months seldom have. Because of this differentiation, both tests were retained in the series.

Three tests for the younger age groups — Peg Board B, Sixteen Cubes, and Nest of Cubes — seem to require more or less the same type of skill in fitting corners and shifting



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the position of the hand to make the smaller square piece fit into its proper place. However, the correlations (product-moment formula) for the 30 to 35 month group were found to be negligible in degree, indicating that there is little duplication in the types of ability tested by these three tests. The correlations are as follows: Nest of Cubes and Sixteen Cubes (36 cases),  $r = 0.03 \pm 0.113$ ; Nest of Cubes and Peg Board B (49 cases),  $r = 0.282 \pm 0.087$ ; Peg Board B and Sixteen Cubes (38 cases),  $r = 0.29 \pm 0.105$ .

The Seguin Form Board and the Action Agent Test are entirely different in content and method, the first testing primarily judgment of form, and the second, comprehension of language and association of meanings. A comparison of the two tests at three different age levels showed no relationship. The correlations were as follows:

AGE GROUP (Months)	CORRELATION (Product-Moment Formula)	NUMBER OF CASES
42-47	$r = 0.086 \pm 0.081$	53
48-53	$r = 0.020 \pm 0.089$	55
54-60	$r = 0.040 \pm 0.087$	59

Analysis of the relationship between the separate tests was continued no further.

When the tests had been carefully considered in this way from the point of view of their suitability for inclusion, they were ready to be combined in a scale.

### THE POINT-SCALE PRINCIPLE FOLLOWED

When a long series of tests is to be given and scored, a straightforward and easily understood method of scoring is desirable, especially if the scale, as in the present case, is to be administered in some instances by examiners who do not understand the theoretical principles involved. The point-scale method was followed in the present series, as solving most satisfactorily the problems involved.

The principle of the point scale can be explained briefly. In such a scale the test elements are usually arranged in approximate order of difficulty, though they are not located in age groupings that correspond to their diagnostic age level, as in an age scale. Consequently the score for the test is expressed in points rather than directly by mental age. Each element passed is usually given a score of one point, and the total score in points is the raw score obtained. This must be interpreted in terms of relative achievement by comparison with standards for the group. From the distribution of raw scores for the separate age groups several derived scores are obtainable, the most commonly used being the mental-age score.

The point-scale method involves first, then, arrangement of the chosen test elements in order of difficulty. Frequently this arrangement is made by inspection or observation, rather than by any carefully worked-out method. A careful ranking of the elements in order of difficulty involves an analysis of the percentage of children passing these elements at the different chronological-age levels; the larger the percentage of success, the easier the test element. A second step in the formation of the scale is the evaluation of each individual record in terms of the total elements passed or the total raw score. These raw scores are tabulated in frequency distributions, and from them the mean score for successive age levels can be obtained. By plotting these values in a curve of score increase with age, it is possible to read off the mental-age value for any given raw score.

The first step, therefore, was to rank the ninety-three test elements according to difficulty and to locate them according to diagnostic level in the point-scale sequence.<sup>1</sup>

<sup>1</sup> For the formula for interpolating in determining the diagnostic levels of test elements and the method of correcting for omissions and refusals described later in the chapter, the writer is indebted to Professor L. L. Thurstone, whose methods, described in the articles referred to in the proper places, these follow or are adapted from.

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In this operation, called the calculation of the age at which a given test element is "at par," the percentage of each age group succeeding in the separate test elements was first determined (see Table 7, "Percentage of Each Age Group Passing the Separate Test Elements"). This process gave a series of gradually increasing percentages from 0, or slightly above, to 100, or slightly below, for each of the test elements. The 50 per cent point in each of these series was of interest. If at 27 months only 14 per cent of the children could do the Seguin Form Board test correctly in two out of three trials, and at 33 months 62 per cent of the children were able to do it, at what age were exactly 50 per cent of the children successful? Obviously, this age lay somewhere between 27 and 33 months, and interpolation was necessary in order to locate it. The formula

$$\text{Age at par} = Y + \frac{0.50 - p_1}{p_2 - p_1}$$

— in which  $p_1$  and  $p_2$  represent the percentages of correct responses immediately above and below 50, and  $Y$  represents the age which has  $p_1$  correct answers — was used in interpolating between the various percentages (67). The "age at par" for the Seguin Form Board was thus found to be 31.5 months.

When the age at par of each of the ninety-three test elements had been thus determined, they were arranged, according to the age at par, in order of difficulty (see Table 8).

### TREATMENT OF OMISSIONS AND REFUSALS

When none of the ninety-three test elements was refused or omitted, the total number of successes served adequately as the final score of the child tested. But when refusals or omissions occurred, this total count of successes was not adequate as a method of scoring.

It was necessary, therefore, to devise a method of correcting for refusals and omissions. Thus far only successes had

been considered; so that a child who had forty successes was scored according to the position of the fortieth test element in the scale.

It is clear, however, that if the child has refused a test, or if a test which would ordinarily be given has been omitted for some reason, neither the refused test nor the omitted one should be counted indiscriminately as a success or a failure, or disregarded.

The most satisfactory procedure in correcting for these omissions and refusals, it appeared,<sup>1</sup> was to count as successes all refused or omitted tests below the level of the child's attainment on the whole scale, and to count as failures all occurring above this level. It was thus possible to score performance in terms of successes without reference to the number of failures, as was done in the case of tests in which no omissions or refusals occurred.

The total score on the child's performance was determined by a counting device. First, all the successes were counted as of equal and unitary value (with those tests omitted because they were too easy for the child counted, of course, as successes). To this count, 1 was added for each omitted or refused test element occurring below the test element corresponding to the total count of successes. If further omitted or refused test elements occurred below the test element corresponding to this new total, these also were added to the count, as having unitary value. Again, if omitted or refused test elements occurred below the test corresponding to this new, augmented total, these also were added. This method of counting was continued until all the omitted and refused test elements with rank numbers lower than that of the total count had been included. Those with rank numbers greater than the final count were excluded.<sup>2</sup>

<sup>1</sup> See note, page 93.

<sup>2</sup> More detailed directions for correcting for omissions and refusals are given in Chapter XIII.

TABLE 7  
PERCENTAGE OF EACH AGE GROUP PASSING THE SEPARATE TEST ELEMENTS

No.	TEST ELEMENT	AGE GROUP (Months)								
		18-23	24-29	30-35	36-41	42-47	48-53	54-59	60-65	66-71
1.	Commands . . . . .	71	86	87	....	....	....	....	....	....
2.	Throwing Ball . . . . .	78	100	100	....	....	....	....	....	....
3.	Straight Tower . . . . .	71	100	100	....	....	....	....	....	....
4.	Questions (1 success) . . . . .	51	78	92	....	....	....	....	....	....
5.	Peg Board A (38'') . . . . .	50	86	95	100	....	....	....	....	....
6.	Walking Block . . . . .	48	83	....	....	....	....	....	....	....
7.	Crossing Feet . . . . .	47	79	....	....	....	....	....	....	....
8.	Sixteen Cubes (13 placed) . . . . .	47	88	97	....	....	....	....	....	....
9.	Words (2 successes) . . . . .	43	74	87	....	....	....	....	....	....
10.	Standing on One Foot . . . . .	28	88	..	....	....	....	....	....	....
11.	Folding Paper . . . . .	35	73	92	....	....	....	....	....	....
12.	Words (4 successes) . . . . .	28	67	83	....	....	....	....	....	....
13.	Identification of Self in Mirror . . . . .	28	67	70	....	....	....	....	....	....
14.	Sixteen Cubes (125'') . . . . .	26	53	73	..	....	....	....	....	....
15.	Peg Board A (25'') . . . . .	27	52	74	92	....	....	....	....	....
16.	Peg Board B (41'') . . . . .	8	50	84	100	....	....	....	....	....
17.	Drawing Up String . . . . .	19	47	77	....	....	....	....	....	....
18.	Nest of Cubes (250'') . . . . .	23	48	62	....	....	....	....	....	....
19.	Questions (6 successes) . . . . .	7	45	62	....	....	....	....	....	....
20.	Cutting with Scissors . . . . .	10	37	83	....	....	....	....	....	....

21.	Word Groups (10 words)	. . . . .	6	35	61	...	...	...	...	...	...
22.	One Button . . . . .	. . . . .	0	19	72	...	...	...	...	...	...
23.	Matching Colors . . . . .	. . . . .	2	20	68	73	...	...	...	...	...
24.	Seguin Form Board (2 successful trials)	. . . . .	0	14	62	86	...	...	100	100	100
25.	Sixteen Cubes (100'')	. . . . .	16	42	51	...	...	...	...	...	...
26.	Peg Board B (27'')	. . . . .	0	23	52	64	...	...	...	...	...
27.	Three-Cube Pyramid (17'')	. . . . .	0	39	50	77	79	83	95	97	97
28.	Peg Board A (20'')	. . . . .	6	29	50	76	...	...	...	...	...
29.	Nest of Cubes (30'')	. . . . .	11	22	50	...	...	...	...	...	...
30.	Two Buttons (170'')	. . . . .	0	4	50	81	88	100	98	98	98
31.	Seguin Form Board (222'')	. . . . .	0	11	50	75	93	100	100	100	100
32.	Word Groups (13 words)	. . . . .	2	12	44	...	...	...	...	...	...
33.	Action Agent (6 successes)	. . . . .	0	4	46	63	77	91	95	97	97
34.	Fist and Thumb . . . . .	. . . . .	0	0	39	83	87	88	...	...	...
35.	Counting Two Blocks . . . . .	. . . . .	6	30	43	...	...	...	...	...	...
36.	Seguin Form Board (109'')	. . . . .	0	11	21	56	79	88	98	100	100
37.	Copying Circle . . . . .	. . . . .	0	7	31	53	81	94	100	100	100
38.	Peg Board A (17'')	. . . . .	4	14	31	52	...	...	...	...	...
39.	Picture Puzzle No. 1 (14'')	. . . . .	0	11	28	52	67	78	91	91	90
40.	Little Pink Tower (33'')	. . . . .	0	7	18	52	64	70	89	88	91
41.	Seguin Form Board (28 errors)	. . . . .	0	4	14	52	79	82	98	97	100
42.	Two Buttons (50'')	. . . . .	0	0	23	51	70	85	95	96	98
43.	Three-Cube Pyramid (11'')	. . . . .	0	21	43	50	60	77	91	86	91
44.	Mare and Foal (317'')	. . . . .	0	0	12	49	64	84	90	92	97
45.	Peg Board B (23'')	. . . . .	0	12	31	48	...	...	...	...	...
46.	Action Agent (10 successes)	. . . . .	0	4	23	44	63	80	77	88	90

(Continued on following page.)

TABLE 7 (Continued)  
PERCENTAGE OF EACH AGE GROUP PASSING THE SEPARATE TEST ELEMENTS

No.	TEST ELEMENT	AGE GROUP (Months)								
		18-23	24-29	30-35	36-41	42-47	48-53	54-59	60-65	66-71
47.	Picture Puzzle No 1 (6'')	0	7	19	39	55	70	79	81	87
48.	Three-Cube Pyramid (9'')	0	14	35	40	53	73	79	78	84
49.	Seguin Form Board (72'')	0	0	11	27	53	63	93	98	95
50.	Seguin Form Board (9 errors)	0	0	0	21	54	47	79	95	97
51.	Little Pink Tower (22'')	0	4	14	39	51	63	81	82	87
52.	Two Buttons (34'')	0	0	12	25	52	60	84	90	91
53.	Decroly Matching (3 right)	0	0	0	16	50	52	79	85	94
54.	Thumb and Fingers (2 right)	0	0	21	35	50	86	96	96	100
55.	Four Buttons (76'')	0	0	14	18	49	75	85	92	93
56.	Copying Cross . . . . .	0	0	0	10	49	48	87	100	96
57.	Mare and Foal (208'')	0	0	12	34	45	71	83	88	91
58.	Action Agent (12 successes)	0	4	14	36	43	67	64	81	81
59.	Picture Puzzle No. 1 (4'')	0	0	15	28	43	63	70	71	78
60.	Seguin Form Board (63'')	0	0	8	18	42	57	88	95	92
61.	Manikin (1 point) . . . . .	0	0	7	21	37	59	71	78	79
62.	Three-Cube Pyramid (7'')	0	11	27	25	42	55	57	61	57
63.	Two Buttons (30'')	0	0	8	15	41	53	78	83	87
64.	Action Agent (13 successes)	0	4	8	26	30	55	59	76	77
65.	Picture Puzzle No. 1 (3'')	0	0	7	25	34	53	62	62	88
66.	Picture Puzzle No. 2 (46'')	0	0	0	22	25	54	76	73	84

67.	Mare and Foal (150'')	0	0	8	24	32	52	71	75	88
68.	Little Pink Tower (17'')	0	0	9	26	35	51	68	78	80
69.	Four Buttons (51'')	0	0	14	6	26	51	69	75	85
70.	Six-Cube Pyramid (35'')	0	0	5	17	30	50	73	71	82
71.	Picture Puzzle No. 3 . . .	0	0	10	12	20	48	79	78	84
72.	Decroly Matching (4 right)	0	0	0	9	46	48	77	85	94
73.	Manikin (2 points)	0	0	7	15	29	44	61	84	73
74.	Little Pink Tower (14'')	0	0	6	19	24	44	58	78	72
75.	Two Buttons (23'')	0	0	6	8	27	37	58	59	67
76.	Picture Puzzle No. 3 (22'')	0	0	0	16	20	28	56	58	67
77.	Seguin Form Board (48'')	0	0	0	1	18	23	56	84	84
78.	Mare and Foal (93'')	0	0	8	12	21	26	50	56	57
79.	Decroly Matching (217'')	0	0	0	3	29	19	51	79	79
80.	Six-Cube Pyramid (20'')	0	0	0	9	18	29	50	52	59
81.	Action Agent (14 successes)	0	4	6	15	23	44	48	71	64
82.	Copying Star (1 right)	0	0	0	0	0	11	47	70	72
83.	Four Buttons (42'')	0	0	9	3	18	36	49	56	67
84.	Two Buttons (19'')	0	0	4	1	14	27	42	54	50
85.	Action Agent (16)	0	4	3	6	11	20	32	52	54
86.	Seguin Form Board (39'')	0	0	0	1	2	8	23	53	63
87.	Copying Star (3 right)	0	0	0	0	0	2	22	53	54
88.	Decroly Matching (160'')	0	0	0	3	7	12	29	50	63
89.	Little Pink Tower (10'')	0	0	3	9	5	21	23	49	45
90.	Mare and Foal (86'')	0	0	4	6	15	19	40	47	54
91.	Decroly Matching (133'')	0	0	0	3	7	5	22	40	50
92.	Manikin (3 points)	0	0	7	6	13	15	34	45	53
93.	Seguin Form Board (35'')	0	0	0	0	0	3	12	46	48



TABLE 8  
TEST ELEMENTS ARRANGED IN ORDER OF DIFFICULTY

No.	TEST ELEMENT	AGE AT PAR (Months)	No.	TEST ELEMENT	AGE AT PAR (Months)
1.	Commands . . . . .	21.0	47.	Picture Puzzle No. 1 (6'')	43.1
2.	Throwing Ball . . . . .	21.0	48.	Three-Cube Pyramid (9'')	43.6
3.	Straight Tower . . . . .	21.0	49.	Seguin Form Board (72'')	44.3
4.	Questions (1 success) . . . . .	21.0	50.	Seguin Form Board (9 errors)	44.3
5.	Peg Board A (38'')	21.0	51.	Little Pink Tower (22'')	44.5
6.	Walking Block . . . . .	21.3	52.	Two Buttons (34'')	44.6
7.	Crossing Feet . . . . .	21.6	53.	Decroly Matching (3 right)	45.0
8.	Sixteen Cubes (13 placed)	21.6	54.	Thumb and Fingers (2 right)	45.0
9.	Words (2 successes) . . . . .	22.4	55.	Four Buttons (76'')	45.2
10.	Standing on One Foot . . . . .	23.2	56.	Copying Cross . . . . .	46.0
11.	Folding Paper . . . . .	23.4	57.	Mare and Foal (208'')	46.2
12.	Words (4 successes) . . . . .	24.4	58.	Action Agent (12)	46.8
13.	Identification in Mirror . . . . .	24.4	59.	Picture Puzzle No. 1 (4'')	47.1
14.	Sixteen Cubes (125'')	26.3	60.	Seguin Form Board (63'')	48.2
15.	Peg Board A (25'')	26.5	61.	Manikin (1)	48.5
16.	Peg Board B (41'')	27.0	62.	Three-Cube Pyramid (7'')	48.7
17.	Drawing Up String . . . . .	27.6	63.	Two Buttons (30'')	49.5
18.	Nest of Cubes (250'')	27.9	64.	Action Agent (13)	49.8
19.	Questions (6 successes) . . . . .	28.5	65.	Picture Puzzle No. 1 (3'')	50.1
20.	Cutting with Scissors . . . . .	28.7	66.	Picture Puzzle No. 2 (46'')	50.2

21.	Word Groups (10 words)	30.5	67.	Mare and Foal (150'')	50.4
22.	One Button	30.5	68.	Little Pink Tower (17'')	50.6
23.	Matching Colors	30.8	69.	Four Buttons (51'')	50.8
24.	Seguin Form Board (2 successful trials)	31.5	70.	Six-Cube Pyramid (35'')	51.0
25.	Sixteen Cube (100'')	32.3	71.	Picture Puzzle No. 3	51.4
26.	Peg Board B (27'')	32.6	72.	Decroly Matching (4 right)	51.4
27.	Three-Cube Pyramid (17'')	33.0	73.	Manikin (2)	53.1
28.	Peg Board A (20'')	33.0	74.	Little Pink Tower (14'')	53.6
29.	Nest of Cubes (30'')	33.0	75.	Two Buttons (23'')	54.7
30.	Two Buttons (170'')	33.0	76.	Picture Puzzle No. 2 (22'')	55.7
31.	Seguin Form Board (222'')	33.0	77.	Seguin Form Board (48'')	55.7
32.	Word Groups (13 words)	34.0	78.	Mare and Foal (93'')	57.0
33.	Action Agent (6 successes)	34.4	79.	Decroly Matching (217'')	57.0
34.	Fist and Thumb	34.5	80.	Six-Cube Pyramid (20'')	57.0
35.	Counting Two Blocks	36.0	81.	Action Agent (14)	57.5
36.	Seguin Form Board (109'')	37.9	82.	Copying Star (1)	57.8
37.	Copying Circle	38.2	83.	Four Buttons (42'')	57.9
38.	Peg Board A (17'')	38.4	84.	Two Buttons (19'')	61.0
39.	Picture Puzzle No. 1 (14'')	38.5	85.	Action Agent (16)	62.4
40.	Little Pink Tower (33'')	38.6	86.	Seguin Form Board (39'')	62.4
41.	Seguin Form Board (28 errors)	38.7	87.	Copying Star (3)	62.4
42.	Two Buttons (50'')	38.8	88.	Decroly Matching (160'')	63.0
43.	Three-Cube Pyramid (11'')	39.0	89.	Little Pink Tower (10'')	63.0
44.	Mare and Foal (317'')	39.4	90.	Mare and Foal (86'')	65.6
45.	Peg Board B (23'')	40.0	91.	Decroly Matching (133'')	69.0
46.	Action Agent (10 successes)	40.9	92.	Manikin (3)	69.0
			93.	Seguin Form Board (35'')	69.0

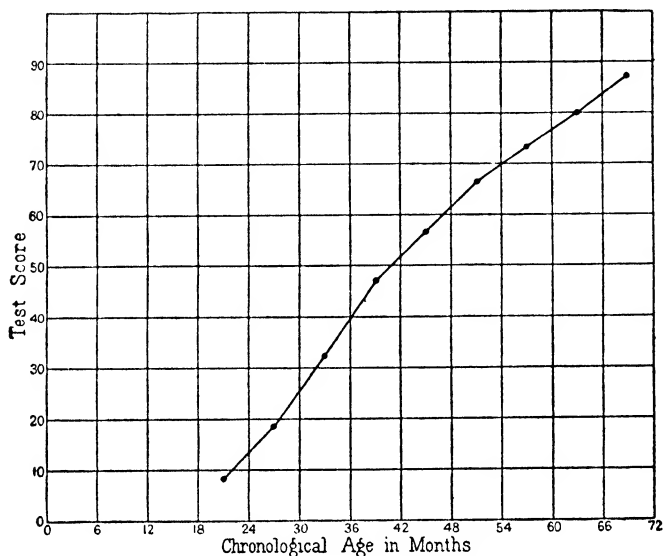


FIG. 2. Curve of score increase with age in the Merrill-Palmer scale.

#### MENTAL-AGE NORMS

The method of determining mental-age norms for the scale was as follows: After the individual scores had been computed according to the method just described, the performance of each child was reëvaluated and assigned a point score (see Table 9, "The Relation of Chronological Age to Test Score," for the distribution of these scores by age for the 631 cases included in the present norms). The mean score for each of the six-month age groups was then determined, and these scores were plotted in the form of an age-score curve (see Figure 2, "Curve of Score Increase with Age in the Merrill-Palmer Test Scale"). This curve is the regression curve of test score upon chronological age. It is

slightly non-linear, as may be seen from inspection. The correlation ratio,  $\eta_{yx}$ , was determined and found to have the value of 0.926. The correlation ratio corresponds roughly to the coefficient of correlation but is a measure of correlation that is commonly used when the regression is not rectilinear. The value of  $\eta_{xy}$  was also determined and found to be 0.942.

The mental-age values of the various scores can be read off directly from this curve of score increase with age (see Table 26, "Mental-Age Norms for Merrill-Palmer Test Scale").<sup>1</sup> Although the curve gives no actual score values

TABLE 9  
THE RELATION OF CHRONOLOGICAL AGE TO TEST SCORE

SCORE	AGE GROUP (Months)									
	18-23	24-29	30-35	36-41	42-47	48-53	54-59	60-65	66-71	72-77
0-4	18			.		..			..	.
5-9	18	5	1	..	.	..	..		.	.
10-14	18	17	6	.	...	.	...	.	.	.
15-19	3	23	5	.	2		..		.	...
20-24	..	15	13	.	..	.	...		..	
25-29	...	5	8	5	..	...	...	.	..	.
30-34	...	2	18	4	1	..	...		.	.
35-39	...	...	14	7	..	...	1	..	...	
40-44	...	...	7	11	6	2	..	...	...	...
45-49	...	...	5	15	7	2	1	.	..	.
50-54	...	...	2	8	5	6	...	...		...
55-59	...	..	1	7	16	10	2	2	1	...
60-64	...	..	...	10	7	8	7	2	3	.
65-69	...	...	...	1	6	11	10	4	4	1
70-74	.	.	1	1	4	8	9	7	6	..
75-79	...	...	..	.	2	10	16	10	9	3
80-84	.	...	...	...	2	2	4	12	12	7
85-89	..	...	..	...	1	...	9	17	29	15
90-94	..	.	..	.		.	2	6	5	23
Total	57	67	81	69	59	59	61	60	69	49

<sup>1</sup> All tables giving norms are presented together at the end of Chapter XIII in order that they may be more readily available in using the test scale.

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for ages below 21 months or above 75 months, approximate values for the three-month age group at each end of the curve can be assigned by projecting the line in each direction. The curve seems to differentiate satisfactorily the score values at the different age levels, except at 63 to 69 months, where there is an increase of only two points in score value for the entire six months.

### STANDARD DEVIATION IN TERMS OF GROSS SCORE

The use of mental-age norms without consideration of the relative variability of different age groups is likely to cause serious errors in interpretation. Accordingly, measures of variability are essential to a valid interpretation of the mental-age norms referred to in the preceding section.

The standard deviation of point scores for each of the six-month age groups was first used as a measure of variability in the study of the gross score. These values are given in Table 10, "Standard Deviation of Each Age Group in Terms of Gross Score." The use of these values, however,

TABLE 10

### STANDARD DEVIATION OF EACH AGE GROUP IN TERMS OF GROSS SCORE

AGE GROUP (Months)	STANDARD DEVIATION IN TERMS OF SCALE UNITS
17.5-23.4	4.55
23.5-29.4	8.13
29.5-35.4	10.50
35.5-41.4	10.75
41.5-47.4	13.75
47.5-53.4	10.00
53.5-59.4	10.50
59.5-65.4	8.75

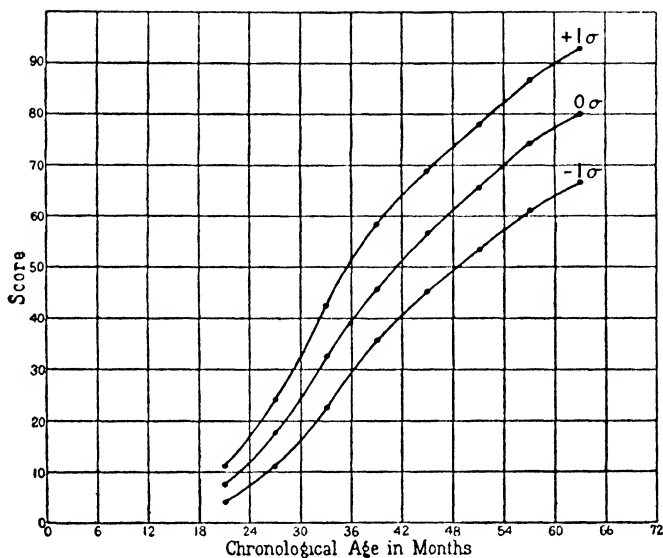


FIG. 3. Standard deviation in terms of score values.

proved impracticable without interpolation because of the correlation between age and score within each age group. Values were therefore interpolated for the intervening months by a smoothed curve, providing for an interpretation of the score in terms of standard deviation according to the exact chronological age in months. The smoothed curves for  $0\sigma$ ,  $+1\sigma$ , and  $-1\sigma$  are shown in Figure 3, "Standard Deviation in Terms of Score Values." To facilitate the practical use of these norms, a table showing standard deviation in terms of score values has been derived from these curves (see Table 27), and from this table have been derived two additional tables of norms which should be useful in interpreting the score (see Tables 28 and 29).

A careful inspection of these tables will show that it is impracticable to use the intelligence quotient with the Merrill-Palmer test scale. At the different chronological-age levels the range of IQ's at  $-2.5\sigma$  varies from 58 to 70. At  $-2.0\sigma$  it varies from 66 to 79, and at  $-1.5\sigma$  from 74 to 83. The nearer  $0\sigma$  the score falls, the less is the variation between the different age levels. At the other end of the distributions the variation is even greater. At  $+2.5\sigma$  the IQ varies from 122 to 165; at  $+2.0\sigma$ , from 119 to 154; and at  $+1.5\sigma$ , from 114 to 141. It is apparent that with this amount of variation such an index has little significance. Accordingly, an interpretation in terms of the standard-deviation value of the score attained or in terms of percentile rank has a greater validity in the Merrill-Palmer scale than has the intelligence quotient.

GROSS SCORE IN TERMS OF PERCENTILE STANDING OF  
EACH AGE GROUP

To provide for interpretation in terms of percentile rank, a table of score values in terms of percentile ranks was computed by the following process: First, rough percentile graphs of the gross scores for all the six-month age groups were made (see Figure 4, "Percentile Graph of Scores in the Merrill-Palmer Test Scale for the Various Age Groups"), and from these rough percentile scores smoothed curves were drawn (see Figure 5, "Smoothed Percentile Curves of Scores in the Merrill-Palmer Test Scale"). From these smoothed curves interpolated values were read by months for the gross score points. These values are arranged in Table 30, "Percentile Ranks in Terms of Score Values," from which may be determined the percentile rank of any score that is made by a child of any age between 21 and 63 months.

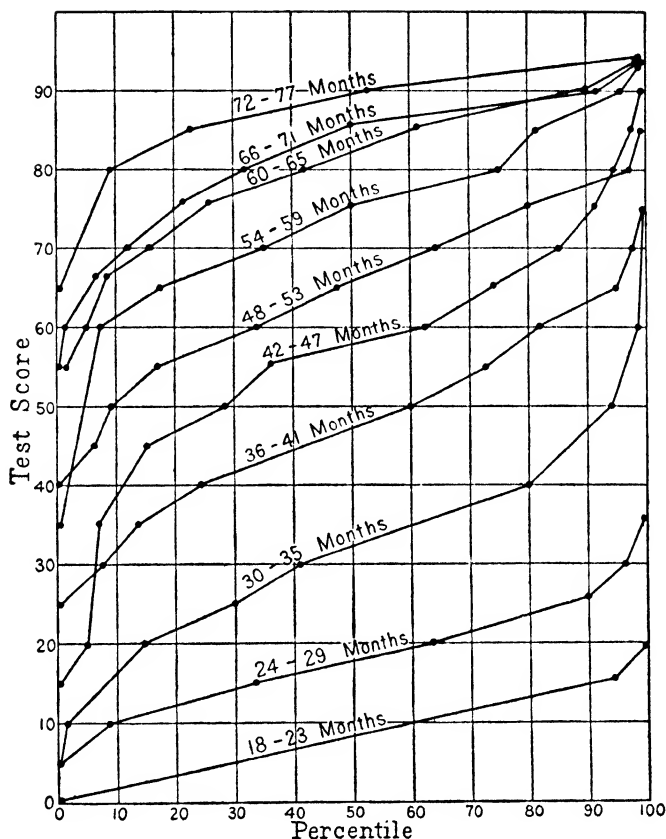


FIG. 4. Percentile graph of scores in the Merrill-Palmer test scale for the various age groups.

#### DIAGNOSTIC RANGE OF THE MERRILL-PALMER TEST SCALE

In standardizing the Merrill-Palmer test scale, the original purpose was to organize a series of tests suitable for children



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from 2 to 5 years of age. In order to make the standardization adequate, however, it was thought advisable to extend the standardization series both above and below the expected age range, and accordingly children were tested down to the age of 18 months and up to the age of 77 months. On the face of it, this provides a test series with an age range of  $1\frac{1}{2}$  to  $6\frac{1}{2}$  years. There is always a temptation to consider these extra age groups, added to each end of the standardization series to round out the distribution, as themselves adequately standardized. As a matter of fact, such a practice seriously affects the validity of the series. The diagnostic range of a test series must be determined by a careful analysis of the distribution to find the point in the age range where normal distribution lapses and distortion begins.

The distribution of scores for children 18 to 23 months of age is decidedly skewed, since the distribution is obviously truncated at the lower end (see Table 9, "The Relation of Chronological Age to Test Score"). The distribution of the 24 to 29 month age group is much more nearly normal, and the results can therefore be used with greater confidence. From this point on to the 54 to 59 month age group the distributions are sufficiently normal to warrant their inclusion in the diagnostic range. While the 54 to 59 month age group shows only a slight truncation at the upper end of the distribution, the tables of norms giving the standard deviation in terms of score values, mental ages, and intelligence quotients show truncation as far down as 48 months. This truncation increases progressively, so that the test series has no value for above-average children of 57 months.

The distributions for the 66 to 71 and 72 to 77 month age groups are so truncated that no value is attached to the norms obtained. While the results for these two age groups were of value in the formation of the scale, they are of little use in differentiating children of more than 63 months of

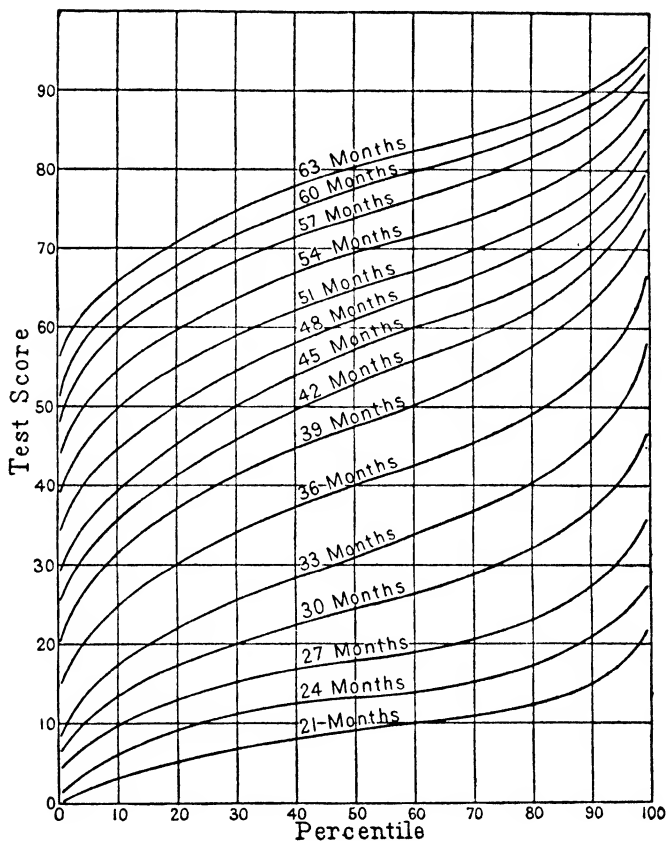


FIG. 5. Smoothed percentile curves of scores in the Merrill-Palmer test scale.

age. Accordingly, though we can use the mental-age norms in scoring up to 78 months and down to 18 months, we do not recommend the test series for children of a chronological age over 63 or under 24 months.

## VALIDITY OF THE MERRILL-PALMER TEST SCALE

Before a test scale is offered as a measure of mental development, there should be some demonstration of its validity. It is difficult, however, to find criteria adequate to checking the validity of a test scale, for available criteria are usually as subjective and assumptive in nature as the scale to be checked. Under these circumstances it seems profitable to check the scale with as many criteria of mental growth as are available.

The following seemed suitable criteria to use in judging the validity of the scale:

1. Each separate test was chosen because it seemed to differentiate between nursery school children of the same age who appeared to be bright or dull as judged by other criteria. The other criteria were subjective evaluations of individual responses to nursery school situations. These observations seemed the more valid in that they were made by several people, and the judgment as to capacity in the case of each child therefore represented, in a way, the "pooled" experience of a group of observers.

2. Since mental development in childhood is shown by all criteria to be definitely related to chronological age, another basis for the selection of test elements was the extent to which they differentiated performances at varying age levels. After the test elements have been selected on this basis, as determined by the results with a small number of children, it is essential, after the series is standardized, to ascertain how far the selection based upon this small number of cases is verified by results upon a much larger number. The correlation between chronological age and score in 631 cases was found to be  $r = 0.921 \pm 0.004$ . This correlation is based upon the data reproduced in Table 9, "The Relation of Chronological Age to Test Score." These

data, like all those used in the standardization series, exclude all cases of children who were judged by other criteria to be feeble-minded or very superior. The correlation is sufficiently high to indicate a high degree of relationship between the chronological age and the test score. It is not, however, so nearly perfect that it excludes the possibility that there are other variables present in the test scale which differentiate children of the same chronological age. In other words, it cannot be said that the scale is measuring chronological age alone.

3. Another important factor to be considered is the degree of overlapping of adjacent groups. At the various age levels percentile values of the scores for the separate age groups are perhaps an effective indication of this overlapping. These curves show that only 5 per cent of the children of the 24 to 29 month age group make a score as low as the median score for the next lower age group, while 12 per cent of the 30 to 35 month age group make a score as low as the median score for the 24 to 29 month group. Table 11, "Overlapping at the 50 Percentile Shown by the Various Age Groups," gives these comparisons for the whole range of age groups. It is evident that the overlapping tends to increase with age. It is small in the three younger age groups, and larger in the older groups.

The results at the 75 percentile are similar (see Table 12, "Overlapping at the 75 Percentile Shown by the Various Age Groups"). This table shows that only 17 per cent of the 24 to 29 month age group make a score as low as the 75 percentile for the 18 to 23 month age group. The frequency distributions for these two age groups are almost totally distinct. This is the finding one might expect on a perfect test scale. However, the overlapping is large at the 66 to 71 month age group, where 71 per cent of the children make a score as low as the 75 percentile of the next younger

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age group, a difference of only 4 per cent in favor of the older group. The differentiation for the majority of age groups is from 30 to 35 points at the 75 percentile; and this is sufficiently large to indicate a real progression from one age group to another. While this progressive differentiation between age groups does not indicate what factor is being measured by the test scale, it does indicate a real development with age in whatever ability or abilities the scale does measure.

TABLE 11

OVERLAPPING AT THE 50 PERCENTILE SHOWN BY THE VARIOUS AGE GROUPS

AGE GROUP (Months)	50 PERCENTILE SCORE IN POINTS	PERCENTAGE OF CHILDREN IN THE NEXT HIGHER AGE GROUP FALLING BELOW THIS SCORE
17.5-23.4	8.0	5
23.5-29.4	17.5	12
29.5-35.4	32.0	9
35.5-41.4	47.5	21
41.5-47.4	57.5	25
47.5-53.4	66.0	20
53.5-59.4	75.0	25
59.5-65.4	82.0	40
65.5-71.4	85.0	22

4. Another criterion of the validity of a test scale is the degree in which it differentiates feeble-minded children from those of normal mentality. To check this differentiation, a brief study was made of a group of children,  $4\frac{1}{2}$  to  $12\frac{1}{2}$  years of age, in the Polk State School, a school for the feeble-minded in Polk, Pennsylvania.<sup>1</sup> A classification of the results is given in Table 13, "Median Mental Age on Merrill-Palmer Test Scale for Each Chronological Age: Feeble-Minded Children from Polk State School, Pennsylvania." Though only twenty-nine children were included

<sup>1</sup> This study was made through the courtesy of Dr. J. M. Murdoch, superintendent of the school.

TABLE 12

OVERLAPPING AT THE 75 PERCENTILE SHOWN BY THE VARIOUS AGE GROUPS

AGE GROUP (Months)	75 PERCENTILE SCORE IN POINTS	PERCENTAGE OF CHILDREN IN THE NEXT HIGHER AGE GROUP FALLING BELOW THIS SCORE
17.5-23.4	12	17
23.5-29.4	22	20
29.5-35.4	39	20
35.5-41.4	56	40
41.5-47.4	65	48
47.5-53.4	73	44
53.5-59.4	80	42
59.5-65.4	87	71
65.5-71.4	88	41

in this study, the results show a significant variation from the normal. There is a tendency for the mental age to increase with chronological age, but the rate of increase is definitely retarded.

5. The validity of a test scale is said to be checked if it shows a high correlation with another scale whose validity is established. Although such a conclusion does not necessarily follow, it seemed of interest to determine the degree of correlation between the Merrill-Palmer test scale and the Stanford Binet test, from which it differs essentially in content. Though the Stanford Binet test is not adequately standardized for preschool children, it is helpful in determining the mental level of preschool children of 3 years or more. For a group of 159 children in the standardization series, all over 3 and under 6 years of age, who were given both series of tests, the correlation (product-moment formula) was found to be  $r = 0.793 \pm 0.019$ . The mental-age range on the Stanford Binet test for this group was from 34 to 70 months, and on the Merrill-Palmer test, from 30 to 78 months.

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TABLE 13

MEDIAN MENTAL AGE ON MERRILL-PALMER TEST SCALE FOR EACH CHRONOLOGICAL AGE: FEEBLE-MINDED CHILDREN FROM POLK STATE SCHOOL, PENNSYLVANIA

CHRONOLOGICAL AGE (Years and Months)	MEDIAN MENTAL AGE (Years and Months)	NUMBER OF CASES
4-6 to 4-11	3-0	2
5-0 to 5-11	4-3	3
6-0 to 6-11	4-3	5
7-0 to 7-11	5-9	3
8-0 to 8-11	5-6	6
9-0 to 9-11	5-0	6
10-0 to 10-11	6-6	1
11-0 to 11-11	6-0	2
12-0 to 12-6	6-3	1

While the group of feeble-minded children at Polk State School who were given both series of tests was relatively small, the correlation was strikingly similar to that for the larger group of normal children; the correlation here was  $r = 0.794 \pm 0.049$  (product-moment formula). The mental-age range on the Stanford Binet test for this group was from 26 to 70 months, and on the Merrill-Palmer test from 31 to 76 months.

For a third group of 115 children — those at the Merrill-Palmer School — who were given both series of tests, the correlation was found to be  $r = 0.783 \pm 0.025$ . The mental-age range on the Stanford Binet test for this group was from 32 to 80 months, and on the Merrill-Palmer test from 30 to 78 months.

These results seem to indicate a fairly definite relation between the two test series. The Stanford Binet test scale has more tests of an informational and verbal type than has the Merrill-Palmer test scale. Though the Merrill-Palmer scale has some language elements, the proportion of tasks

of a performance type is so much larger than in the case of the Stanford Binet scale that children handicapped by such factors as deafness or a foreign-language background can be rated by it when a rating would be impossible with the Stanford Binet test.

In order to determine the relation of the Stanford Binet scale and the language elements of the Merrill-Palmer scale, a corollary study was made of the Action Agent Test, which is the chief language test in the Merrill-Palmer scale. Observation seemed to show a moderate relation between this test and the Stanford Binet mental age. For 157 cases the correlation between the number of words correctly given for the Action Agent Test and the Stanford Binet mental age was  $r = 0.607 \pm 0.034$ .

This moderate correlation was at first explained by the emphasis upon verbal elements in the Stanford Binet test. However, investigation showed the correlation between the score on the Action Agent Test and the total score on the Merrill-Palmer test scale to be  $r = 0.716 \pm 0.017$  for 354 cases. Considering the large number of tests of a performance type in the Merrill-Palmer scale, and the nature of the Action Agent Test, which, like the Stanford Binet series, is so definitely linked up with vocabulary and the use of language, it is difficult to explain why the degree of correlation between the Action Agent Test element and the entire Merrill-Palmer scale should be greater than that between the Action Agent Test and the Stanford Binet scale. It cannot be explained on the basis of the Action Agent Test's being part of the test scale with which it is being correlated, since the difference between complete success and complete failure on the Agent Action Test would alter the score on the whole test series by only 6 points, out of a possible 93 points.

To sum up the case for the validity of the Merrill-Palmer test scale, we can make the following points:



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1. The test elements were selected originally because they differentiated children who, as judged by the general impression of the Merrill-Palmer nursery school staff, showed differences in mental ability.

2. The total scores show a correlation] of  $r = 0.921 \pm 0.004$  with chronological age.

3. The overlapping of the distribution of total scores between the various age groups is relatively small.

4. The scale seems to differentiate the feeble-minded child from the normal one, as judged by the consistent results in the relatively few cases studied.

5. The correlation of the scale with the Stanford Binet scale is consistently high in three instances, as follows:

GROUP	CORRELATION (Product-Moment Formula)	NUMBER OF CASES
Standardization	$r = 0.793 \pm 0.192$	159
Polk State School	$r = 0.794 \pm 0.049$	29
Merrill-Palmer	$r = 0.783 \pm 0.025$	115

## CHAPTER SEVEN

### INFLUENCE OF ENVIRONMENT, SEX, AND RESISTANCE ON THE TEST SCORE

#### EFFECT OF ENVIRONMENT AND SOCIAL LEVEL ON THE SCORE

EARLY experience with test results at the Merrill-Palmer School showed what seemed to be a decided improvement in Stanford Binet test scores as a result of the stimulating environment of the nursery school. In a study made by Woolley (77), a group of nursery school children were compared with a group of children from the same social level who were on the waiting list of the Merrill-Palmer nursery school. While the number of cases was small, the results were so striking as to suggest that the environment in which a young child is placed has even more effect upon his standing in mental tests than we had previously thought.

The present study offered another opportunity to compare children from the two groups. The results seem to bear out the earlier conjecture of Woolley, that a nursery school environment has a decidedly favorable effect upon the mental-test score.

The analysis shows that the median percentile rank for a group of 189 children on the Merrill-Palmer waiting list, scattered evenly over the age range of 2 to 5 years, was 52.5, while for a group of 131 Merrill-Palmer nursery school children, chosen irrespective of the length of their stay in the school, the median percentile rank was 74.7. The percentile ranks were based upon total scores on the Merrill-Palmer test scale, irrespective of age. A detailed analysis of these data is given in Table 14, "Distribution of Percentiles in Merrill-Palmer Test Scale, with Cases Analyzed According to Source and Sex."

These are the only two groups included in the study which are sufficiently similar in social level to warrant attributing

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the difference in test score to the environmental factor alone. A comparison of the other groups shows interesting differences, which cannot, however, be taken very seriously, owing to the relatively small number of cases.

The school group includes ninety-four children from 2 to 5 years of age brought in to be tested by older brothers and sisters attending the Detroit schools. The median percentile rank of the total score for this group was 48.3, which is only slightly lower than that for the waiting-list group.

The child-care agency group includes one hundred children from orphanages, day nurseries, and other child-care agencies, such as the Children's Aid Society and the St. Vincent de Paul Society. Most of the children obtained through the Children's Aid and the St. Vincent de Paul societies were living in fairly satisfactory homes, but many of them, in addition to a possible hereditary handicap, had had a disproportionate share of neglect and unwise treatment before they were brought to the attention of the agency. Children who were obviously abnormal were not included in this standardization at all, and there was a larger proportion of this type of child among the child-care agency group than among any other. For this group the median percentile rank was 38.3, which, even allowing for the small number of cases, is low enough to stand out in striking contrast to those of the other standardization groups, which are practically at the 50 percentile point.

The health-clinic group includes sixty-seven normal children who attended either the Michigan Health Show, the Bellefonte (Pennsylvania) Red Cross Well-Baby Clinic, or the Consultation Center of the Merrill-Palmer School. The median percentile rank for this group was 52.5, which corresponds exactly to that of the waiting-list group.

TABLE 14

DISTRIBUTION OF PERCENTILES IN MERRILL-PALMER TEST SCALE, WITH  
CASES ANALYZED ACCORDING TO SOURCE AND SEX

PERCENTILES	MERRILL-PALMER NURSERY SCHOOL		MERRILL-PALMER WAITING LIST		SCHOOLS		CHILD- CARE AGENCIES		HEALTH CLINICS	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
0-4	1	2	2	1	6	.	2	6		2
5-9			4	1	3	3	4	1	1	6
10-14	1	1	1	4	4	4	6	7	2	2
15-19	.	..	2	2	2	.	4	3	1	2
20-24	2	.	3	7	2	6	3	1	1	1
25-29	3	1	8	7	5	2	3	4	3	4
30-34	3	3	8	5	1	3	3	1	2	1
35-39	2	1	3	3	.	1	3	.		
40-44	3	3	4	4	3	.	4	2		1
45-49	2	4	10	8	1	2	3	5	1	1
50-54	..	4	4	11	6	2	.	3	2	3
55-59	2	2	4	3	1	1	1	2		2
60-64	7	1	5	2	..	1	2	3	1	3
65-69	6	4	5	5	1	5	3	1	2	4
70-74	5	3	4	8	2	3	2	3	2	1
75-79	11	8	7	3	1	2	2	1	2	1
80-84	4	9	7	4	4	3	4	.	2	3
85-89	2	1	4	6	3	3	1	3	3	2
90-94	7	2	3	7	1	1	2	1	1	1
95-99	11	10	5	5	1	5		1	1	
Total	72	59	93	96	47	47	52	48	27	40
Median percentile	74	75.3	51.9	52.7	40.8	57.5	36.7	42.5	62.5	50
Sexes combined										
Total	131		189		94		100		67	
Median percentile	74.7		52.5		48.3		38.3		52.5	

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**TABLE 15**  
**DISTRIBUTION OF AGE-SEX GROUPS**

PERCENTAGE OF EACH SEX IN THE TOTAL DISTRIBUTION							
AGE GROUP (Months)	18-23	24-29	30-35	36-41	42-47	48-53	54-59
Boys . . . . .	49.1%	50.7%	45.5%	41.3%	38.0%	47.0%	63.5%
Girls . . . . .	50.9	49.3	54.5	58.7	62.0	53.0	36.5
PERCENTAGE OF EACH SEX IN EACH THREE-MONTH AGE GROUP							
Older Three Months							
Boys . . . . .	50.0%	48.7%	71.5%	66.7%	52.7%	58.3%	45.4%
Girls . . . . .	65.5	65.7	62.0	47.0	54.8	40.8	36.5
Younger Three Months							
Boys . . . . .	50.0	51.3	28.5	33.3	47.3	41.7	54.6
Girls . . . . .	34.5	34.3	38.0	53.0	45.2	59.2	63.5
PERCENTAGE OF EACH SEX FROM EACH SOURCE							
Waiting List							
Boys . . . . .	39.3%	38.4%	60.0%	62.5%	57.8%	29.1%	39.3%
Girls . . . . .	34.5	47.3	42.8	61.7	51.6	40.7	36.7
Schools							
Boys . . . . .	21.4	28.2	28.5	25.0	15.7	25.0	19.4
Girls . . . . .	17.2	39.4	28.5	17.6	22.5	33.3	21.0
Child-Care Agencies							
Boys . . . . .	25.0	5.1	11.4	12.5	26.3	37.5	39.3
Girls . . . . .	13.8	2.6	9.5	17.6	22.5	22.5	42.1
Health Clinics							
Boys . . . . .	14.3	28.2	0.0	0.0	0.0	8.3	3.0
Girls . . . . .	34.5	10.5	19.0	2.9	3.2	3.7	0.0

cates that there are frequently differences in distribution which might make a comparison of sex differences unsound (see Table 15).

TABLE 16

MEDIAN PERCENTILE RANKS FOR TOTAL SCORES FOR 571 CHILDREN FROM TWO TO FIVE YEARS OF AGE, ANALYZED ACCORDING TO SEX AND SOURCE

SOURCE	BOYS		GIRLS		SEXES COMBINED	
	Number	Median Percentile	Number	Median Percentile	Number	Median Percentile
Merrill-Palmer Nursery School .	72	74.0	59	75.3	131	74.7
Merrill-Palmer Waiting List .	93	51.9	96	52.7	189	52.5
School . . . .	47	40.8	47	57.5	94	48.3
Child-Care Agencies . . .	52	36.7	48	42.5	100	38.3
Health Clinics . .	27	62.5	40	50.0	67	52.5

When the percentile rank of the total score of each child, irrespective of age, is given, it is possible to observe the trend of sex differences in the group as a whole. An analysis of these data is shown in Table 16, "Median Percentile Ranks for Total Scores for 571 Children from Two to Five Years of Age, Analyzed According to Sex and Source." This analysis shows that in the two largest groups — the Merrill-Palmer nursery school and the Merrill-Palmer waiting-list groups — where the number of cases runs well above one hundred, there appear to be no sex differences. In the school and child-care agency groups, where the number of cases is somewhat smaller, there is a decided sex difference in favor of the girls. In the health-clinic group, where there are only sixty-seven cases, there is a rather striking difference in favor of the boys.

These data seem to show that, as far as the total score on the Merrill-Palmer test scale is concerned, there are no significant sex differences, and that conclusions about sex differences

TABLE 19

LANGUAGE TESTS: MEDIAN SCORES, BY AGE AND SEX GROUPS

AGE GROUP (Months)	18-23		24-29		30-35		36-41		42-47		48-53	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Questions												
Median . . . .	1	1	4	6	6	6	.	.	.	.	.	..
Number . . . .	27	28	30	23	26	33	.	.	.	.	.	.
Word Groups												
Median . . . .	0	0	7	10	12	12	..	.	.	..	..	..
Number . . . .	27	25	31	23	25	26	.	.	.	.	..	..
Action Agent												
Median . . . .	..	.	..	..	5	4	8	9	11	11	13	13
Number . . . .	..	..	..	..	37	34	36	37	21	36	26	30

## RESISTANCE IN THE TEST SITUATION

Recent studies of the resistance and negativism displayed by children in mental-test situations tend to show that these factors occur much more frequently between the ages of 12 and 48 months than at any later period. In the standardization of the present test series many children were encountered who refused part or all of the tests presented. The study therefore offered an opportunity to obtain further evidence on the nature of this "refusal tendency."

An analysis of the refusals to cooperate at all or to attempt certain tests indicates that there are at least four types of variables influencing this tendency, as follows:

1. *Factors related to the administration of the test affect the degree of resistance.* The child of preschool age demands a different type of testing technique from that used with the older child. Further, a different approach is necessary at each age level of the preschool period. The child of 2 must be approached somewhat differently from the way the child

of 3 is approached, and so on. Unless the examiner is skilled in presenting the test to the young child, the proportion of refusals will be large.

The administrative factors influencing the child's degree of resistance in the test situation are many and varied. A sample list will give an idea of their multiplicity:

1. Undue amount of praise.
2. Insufficient praise.
3. Expectation that the child is going to refuse.
4. Too much insistence upon the child's completing a difficult task.
5. The examiner's lack of interest in the test material as indicated by his tone of voice.
6. Too much talking by the examiner — effusiveness.
7. Too few comments from the examiner.
8. Comments that tend to make the child self-conscious.
9. The presence of a third person in the room, especially if this third person talks, or laughs at the child.
10. Unwise order in presenting tests, such as
  - (a) giving a child too difficult a task to begin with,
  - (b) giving in succession too many tests that tend to make the child self-conscious or to give him a sense of failure.
11. Too great haste in administering the tests.
12. Lack of skill in keeping the child happily occupied during the examination — letting the examination “drag.”

The examining room definitely affects the child's response to the mental test. If it is strange and unlike any place with which the child is familiar, greater effort is required from the child to adjust himself to it. A room of hospital type, for instance, shining white and tidy, perhaps with “queer looking” instruments in glass cases, may appeal to



the adult as more "professional," but it is not likely to bring forth the best response from little children.

2. *The condition of the child at the time of the examination definitely affects the amount of resistance shown.* A tired child is more likely to refuse mental tests than is a rested child. It takes very little to make a child irritable when he is fatigued. Bringing the child to the clinic often greatly fatigues him; this is especially true with children under 3 years of age.

Children are frequently brought for mental tests when they are in poor physical condition. Slight physical disturbances, such as colds and digestive upsets, tend to make the child irritable and emotionally dependent upon the mother. Needless to say, the results of a mental examination of a child below par physically cannot be considered at all reliable, and the impression of the child's personality reactions obtained at such a time is very likely to be erroneous.

Conditioned emotional responses are frequently the cause of refusals. Many refusals are directly traceable to the child's unfavorable conditioning to some element in the test situation. If the child has a fear of doctors' offices due to some unpleasant association and the psychological examiner is called a doctor, or the examining room reminds the child of a doctor's office, the conditioned response is immediately called forth and may be very difficult to overcome.

The examiner may be the unwitting cause of bringing out an unfavorable conditioned response. His face may remind the child of some unpleasant situation, or his voice may have some unfavorable association. In many cases of resistance it is difficult to say just what element is producing the result.

In some instances, however, we can see a fear reaction to definite objects. The scissors test, which is usually very popular with the children, has produced such an effect in a few instances, the child withdrawing with definite fear reac-

tions and refusing to touch the scissors. There have been a few instances of a similar response to the mirror test.

Emotional dependence on the mother tends to make successful administration of the test very difficult. The treatment and training the child has received at home very definitely determine the amount of coöperation he will give in the test situation.

3. *The amount of resistance varies with the type of test.* An analysis of the number of refusals of each test shows that different types of tests occasion different amounts of resistance, and that by far the largest number of refusals are caused by tests that in some way make the child self-conscious (see Table 20). The tests of crossing the feet and standing on one foot show much the highest percentage of refusals. These tasks require physical manipulation of the feet, and even the child who is willing to attempt them is often obviously self-conscious about it. An interesting sequel to a refusal to attempt these tests is a furtive practicing "on the side" when the examiner is apparently busy with something else and not attending to the child. The Walking Block Test is not so clearly of this type, but the self-conscious reactions appearing when it is administered and the secret practice so frequently occurring afterward prove it to be so.

Tests requiring a language response only, like the questions and the repetition of words and word groups, seem to bring out a considerable amount of resistance.

Levy and Tulchin (43) have aptly explained this tendency to show discriminative differences in resistance with varied types of test as depending upon whether the examiner is "inside" or "outside" the test situation. They state that in their study the Imitation of Movement Test in the Kuhlmann scale at the second-year level called forth more resistance than any other.

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Tests involving objective material on which the child can center his attention without being conscious of the presence of the examiner seem to produce relatively little resistance. The Sixteen-Cubes Test, the Nest of Cubes, the Three-Cube Pyramid, the Picture Puzzles, the Wallin Peg Boards, and the Button tests all belong to this group.

4. *The frequency of resistance is definitely related to the age of the child tested.* Although children at the younger age levels show more resistance to all test elements, the age at which the maximum of resistance occurs is not the same for the various test elements. Thus, the Folding Paper Test called forth much more resistance at the 24 to 29 month age level than at either the 18 to 23 month or 30 to 35 month age levels. The Crossing the Feet Test shows a larger percentage of refusals at the 18 to 23 month age level than at the 24 to 29 month age level. There is a tendency, however, for the 24 to 29 month age group to show resistance to the maximum number of tests.

The test situation makes many more demands of the very young child than of the older one. It is more difficult for him to adjust himself to the novel and strange in the examining room; he is likely to be more emotionally dependent upon his parents; and he becomes fatigued more easily, especially since many young children are accustomed to a nap in both the morning and afternoon and bringing them to be tested upsets this regular program. The younger the child, therefore, the less may he be expected to adjust himself to the test situation, and the more must the examiner expect to adapt the situation to the child.

An analysis of the proportion of refusals by age, after the method of Levy and Tulchin (42), indicating whether the child completely refused to take any test (complete refusal), or refused one or more tests (partial refusal), or refused none at all (no refusal), shows that in the present study the num-

TABLE 20. NUMBER AND PERCENTAGE OF REFUSALS OF EACH TEST IN EACH AGE GROUP

TEST	AGE GROUP (Months)									
	18-23		24-29		30-35		36-41		42-47	
	No	%	No	%	No	%	No	%	No	%
Crossing Feet . . . . .	11	37	12	26	.	.	..	.	.	..
Standing on One Foot . . .	12	22	12	26	.	..	..	.	.	.
Walking Block . . . . .	7	19	10	21	..	.	..	.	..	.
Folding Paper . . . . .	4	8	10	17	4	7	.	.	.	..
Counting Two Blocks . . .	3	6	6	17	5	10	.	.	.	..
Questions . . . . .	2	4	8	14	3	5	.	.	.	.
Fist and Thumb . . . . .	.	.	0	0	8	15	2	6	4	14
Words . . . . .	3	6	7	12	5	8	.	..	.	..
Word Groups . . . . .	4	7	8	14	9	15	.	.	.	..
Drawing Up String . . . .	4	8	7	12	5	8	.	.	..	.
Straight Tower . . . . .	1	2	8	11	3	6	.	.	..	.
Cutting with Scissors . . .	2	4	6	10	4	6	.	.	.	.
Commands . . . . .	1	2	5	10	4	8	.	.	.	.
Copying Circle . . . . .	.	.	8	10	4	5	1	1	0	0
Peg Board B . . . . .	2	4	5	9	1	2	0	0	.	.
Throwing Ball . . . . .	0	0	6	9	3	5	.	.	.	.
Picture Puzzle No. 2 . . .	.	.	.	.	2	9	1	3	0	0
Picture Puzzle No. 3 . . .	.	.	.	.	2	8	1	3	0	0
Two Buttons . . . . .	5	8	6	8	5	6	1	1	0	0
Four Buttons . . . . .	5	8	6	8	1	5	1	2	0	0
Sixteen Cubes . . . . .	1	2	6	8	3	4	.	.	.	.
Identification in Mirror . .	3	6	4	8	3	6	.	.	..	..
One Button . . . . .	5	8	4	7	4	7	.	.	.	..
Peg Board A . . . . .	1	2	4	7	0	0	0	0	.	.
Nest of Cubes . . . . .	1	2	4	7	2	3	.	.	.	.
Three-Cube Pyramid . . . .	.	.	2	7	2	3	1	1	0	0
Matching Colors . . . . .	1	2	4	7	2	3	.	.	.	.
Thumb and Fingers . . . .	.	.	.	..	1	7	3	5	4	8
Manikin . . . . .	..	..	.	..	.	2	2	6	0	0
Picture Puzzle No. 1 . . .	.	..	.	..	4	5	1	1	0	0
Mare and Foal . . . . .	..	..	1	5	1	4	1	1	0	0
Six-Cube Pyramid . . . . .	..	.	1	4	1	5	1	2	0	0
Action Agent . . . . .	.	..	1	4	3	4	3	4	2	4
Little Pink Tower . . . . .	..	.	1	4	2	3	1	1	0	0
Seguin Form Board . . . . .	..	..	..	..	2	2	1	1	0	0
Decroly Matching . . . . .	..	..	.	..	0	0	1	3	0	0
Copying Star . . . . .	..	..	.	..	0	0	1	2	0	0
Copying Cross . . . . .	.	..	.	..	0	0	1	2	0	0

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ber of complete refusals was very small (see Table 21). It is usually possible to get the child to attempt some tests. With the exception of a slight rise at the 42 to 47 month age level, which is probably a chance variation, the proportion of partial refusals decreases with age, and there were practically no refusals after the fourth-year age level.

These results are hardly to be compared with those obtained by Levy and Tulchin, in whose study the tests used were quite different, the testing period was only eight to twelve minutes long, and the children were tested at child health shows and county fairs under more or less unfavorable conditions. The conditions of the testing in their study seem to have occasioned the maximum amount of resistance, while in the present study an effort was made to reduce resistance to a minimum by spending as much time as necessary in getting a coöperative response from the child. Further, the Levy and Tulchin study was planned to get at the negative tendency in the personality of children, not to secure a test score, and accordingly each child was given the same treatment, as far as possible. Their method there-

TABLE 21

NUMBER AND PERCENTAGE OF COMPLETE AND PARTIAL REFUSALS  
IN EACH AGE GROUP

AGE GROUP (Months)	COMPLETE REFUSAL		PARTIAL REFUSAL		NO REFUSAL	
	Number	Percentage	Number	Percentage	Number	Percentage
18-23	1	1.5	28	43.1	36	55.4
24-29	4	4.6	29	33.3	54	62.1
30-35	0	0.0	22	24.4	68	75.6
36-41	1	1.3	3	3.8	74	94.9
42-47	0	0.0	7	11.1	56	88.9
48-53	0	0.0	1	1.7	59	98.3
54-59	0	0.0	1	1.6	60	98.4

fore was in sharp contrast to that of the examiners in the standardization of the Merrill-Palmer test scale, who made every effort to adapt the test situation to the child in order to get the maximum of coöperation.

The four groups of variables just described are so closely interrelated that it is impossible to say which most influences the results. On first view one might think that the reason for the large proportion of refusals of some of the tests is that they are placed in the younger age groups, where the children are supposedly more resistant. An analysis of the results for the various test elements, however, shows variations in the proportion of refusals at the upper age levels (see Table 20). As at the younger age levels, the tests showing a relatively high proportion of refusals at these older levels are those tending to make the child self-conscious.

At the older age levels below the 48 to 53 month age level, above which there were practically no refusals, the Closing Fist and Moving Thumb Test shows the greatest proportion of refusals (14 per cent at the 42 to 47 month age level), and the Opposition of Thumb and Fingers Test the next largest proportion (8 per cent at the same level). The only other test showing refusals at this age level is the Action Agent Test, which calls merely for a verbal response.

An analysis of the tests in which the examiner is "inside" the test situation indicates that such tests are relatively more frequent at the younger age levels. These tests, in general, include the following:

- Crossing Feet
- Standing on One Foot
- Making a Block Walk
- Folding Paper
- Counting Two Blocks
- Questions
- Repetition of Words
- Repetition of Word Groups

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Action Agent  
Fist and Thumb  
Opposition of Thumb and Fingers  
Drawing Up String  
Commands  
Identification of Self in Mirror

A summary of the relative frequency of this type of test at the different age levels shows the following results :

AGE GROUP (Months)	PERCENTAGE OF TESTS
18-23	52
24-29	50
30-35	38
36-41	15
42-47	17

It is evident that the younger age groups have more than their share of tests of this type, nearly all of which fall in the age groups below 36 months. The reason for the larger proportion of these tests at the lower age levels is, of course, the difficulty of finding satisfactory timed objective tests for these ages. It appears probable, therefore, that the larger number of refusals at the younger age levels has some relation to the larger proportion of these tests that tend to make the child self-conscious. It is evident, however, that the proportion of refusals of tests not of this type is also somewhat higher at the younger age levels than for children over 3 years of age, and that while there were fewer children at the 24 to 29 month age level than at the younger age level who refused at least one test of the series, the number of tests refused per child is relatively larger at the older age level (see Table 20). So it would seem that one refusal is more likely to follow another at the age of 24 to 29 months than at any other time. However, an analysis of the number of refusals per child is unwarranted, since varying numbers of tests were given to the children.

Levy and Tulchin found a slight sex difference in the number of refusals at the different age levels. An analysis of the present data from this point of view would be valueless because of the small number of cases.

Undoubtedly many factors are involved in producing resistance to the test situation in young children, but at present it is difficult to determine the relative strength of these variables.





**PART THREE**

**GUIDE FOR ADMINISTERING THE MERRILL-  
PALMER SCALE**



## CHAPTER EIGHT

### GENERAL DIRECTIONS

THE scientific administration of a mental test requires that all variables except that of the child's response to the test situation be carefully controlled. In order to insure such controlled conditions in the administration of the group of tests selected for standardization in the present scale, the method of giving each test had to be worked out in detail and closely adhered to by the various examiners. In some instances only slight modifications might have affected the test level to a marked extent: A failure to demonstrate in a test when demonstration was indicated might have made the test much more difficult, or the chance display to the child of a picture puzzle put together in the right arrangement might have made the test much easier.

Rigid adherence to the exact form of giving the test does not always make for good testing technique with young children; but neither does modification of the methods to the extent of increasing or decreasing the difficulty of the performances. Ease and confidence in the test situation are necessary in order to secure optimum coöperation and response from the child. Free conversation about the test materials which in no way affects the difficulty of the performance, interspersed with the memorized set speeches so given that they do not sound like set speeches, produces the most favorable results. Consequently, in the directions for the separate tests care was taken not to insist upon a definite way of saying the directions when that seemed unimportant. It is intended that the emphasis at all times be placed upon the test objective rather than upon a mechanical presentation.

The mental test for the preschool child requires a technique of administration and a plan of test organization differ-

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ent from those used with older children and adults. With tests for older groups there is a tendency to require the examinee to adapt himself to the conditions of the test. His ability to do so is considered a partial index to his general ability to adapt himself to the changing conditions of life. In testing the preschool child, such a point of view is untenable. The adjustment here must be made by the examiner, not the child.

With the preschool child the incentive of competition with others — any ambitious motive — is relatively small. Unless an objective interest and a genuine pleasure in the test are maintained and a complete rapport is established between the examiner and the child, the test will not be successful. The child's desire to do well before the examiner and the incentive this desire provides are entirely dependent upon this rapport. The ever-varying personalities of the children thus require much adaptability on the part of the examiner.

The examiner must be able to take advantage of each bit of curiosity or pleasure induced by a particular test to further the carefully built-up rapport. At the first sign of distaste or fatigue he must be ready to give the proper amount of encouragement to reawaken the child's interest in the test. If continuing a test is so distasteful to the child that it is likely to render the rest of the test series relatively less appealing, or if it is going to make the child antagonistic, the test should not be continued. The examiner must be able to judge just when to stop urging the child to continue or complete a test. It is important that the examiner should be able to omit part of the tests and still obtain an accurate rating of the child's ability. Fatigue, resistance, and lack of interest will otherwise invalidate many an examination. It is obviously inaccurate to score refused and omitted tests indiscriminately as failures or successes. Tests that have

little appeal must be introduced judiciously and cannot be introduced at exactly the same moment with different children. A series of tests which does not allow for these adjustments in the order of administration, and for refusals and omissions, is unsatisfactory for use with the preschool child. Such a test is too much influenced by the variable of personality to be a trustworthy measure of intelligence.

There must also be considerable leeway allowed in the conversation between the examiner and the child. Examiners should cultivate the ability to talk without giving clues to the correct solution of a test. Noncommittal replies and refusals of requests for aid, in the form of, "I am going to see if you can do that all by yourself," are useful methods of evading the issue.

The following rules are given to insure uniformity in the administration of the test scale.

#### THE TESTING ENVIRONMENT

1. The child should be tested in a well-lighted and well-ventilated room, not too cold or too warm. He should not be placed too near a radiator or in a draught. It is desirable that he should sit with the light falling over his left shoulder. Any position making it necessary for him to face directly the light from a window should be avoided.

2. A child's table and chair should be a part of the equipment of the testing room. If they are not obtainable, the child should be placed in a high chair or raised in some comfortable way in an ordinary chair to a level where he can freely manipulate the objects on the table without raising his arms to an uncomfortable height. A comfortable position is necessary for the successful administration of the test.

3. The testing room should be comfortable and inviting to the child without being conspicuous in its furnishings.

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Plain white walls and a bare, unfurnished appearance that may remind children of the "doctor's office," toward which many of them are unfavorably conditioned, should be avoided. Glass-doored cabinets filled with strange objects and instruments are undesirable for the same reason. Objects of special interest to young children — toys, picture books, etc. — should not be visible during the examination, since they tend to distract the child's attention from the test. Attractive pictures on the wall, however, seem to favor a good reaction.

4. The presence of a third person in the room always seems to diminish the degree of rapport possible between the examiner and the child. However, if the person observing is seated unobtrusively back of the child and takes no part in the examination, the test results will not be seriously distorted. It is seldom advisable for the examiner to converse with a third person during the examination.

It is a safe rule never to allow another child to be present in the examining room, whether the child be older or younger. The presence of another child is distracting and frequently involves undesirable emotional reactions.

It is frequently necessary to have one parent — but never two — present in the examining room, though whenever possible it should be avoided. If the child seems decidedly dependent upon the parent, it is advisable to admit the parent rather than bring on an emotional upset by his exclusion. The parent should be carefully instructed to stay in the background and to allow the examiner to make his own approach to the child. It is seldom profitable to have the parent talk about the tests to the child. Occasionally a test result has had to be discarded because the parent innocently gave the child too much help. As a rule a child responds better to the test situation when the parent is not in the room.

ADMINISTERING THE TEST <sup>1</sup>

1. The test material should be placed in attractive boxes, which may be left in plain sight of the child. One satisfactory way of presenting the tests to the child is to make one pile of the tests that are yet to be seen, and another pile of the completed tests, both in their boxes. The child frequently wishes to choose which box he is to see next. This is usually permissible, but if for any reason the examiner does not wish to show the chosen test next, the child is easily dissuaded with the promise of seeing it soon.

2. It is always wise to begin the examination with a test item that has great intrinsic appeal and is easily done by an average child of the age of the child who is being tested. Good beginning tests are Wallin Peg Board A, Sixteen-Cubes Test, and Little Pink Tower. Interest in the examination is enhanced if the child is allowed to help pack the test material back into its box when the assigned task has been completed.

3. Time should be taken with a stop watch. The stop watch should be held in the examiner's lap or otherwise kept as inconspicuous and noiseless as possible. A watch with a large second hand may be substituted for a stop watch if necessary. However, such a watch necessitates extra care in timing, and, even so, the time records are likely to be considerably less reliable than those taken with a stop watch, especially in tests lasting only a few seconds or in the timing of which minutes as well as seconds have to be counted.

The time is recorded in each case from the time the child touches the test material with the obvious intention of carrying out the examiner's request. If for any reason the examiner misinterprets the child's intention — which happens most

<sup>1</sup>The materials for the Merrill-Palmer Scale of Mental Tests can be obtained from the C. H. Stoelting Company, Chicago.



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frequently with the younger children — and starts the watch at the wrong time, it should be snapped back to zero and started again at the proper time.

Time is always taken out for legitimate interruptions.

No time is recorded if the child fails to complete the test.

The watch is stopped the instant the child has completed the test, whether the last move be placing a block or card, or something else, and irrespective of whether or not the child has removed his hands from the material or has definitely indicated that he has finished.

4. Children differ greatly in fatigability. If the child shows obvious signs of fatigue, the test must be discontinued.

5. If the child has spent the time just preceding the test in a tantrum, it is seldom possible to get a satisfactory test.

6. Begin testing at the age group in which the child's chronological age falls, unless he is over 47 months old. In that case begin with the 48 to 53 month test. The chronological age is given in months. If the child's age in months has a fraction of over one-half a month, the fraction is considered as one month; e.g., 29 months 16 days is called 30 months. If the age in months has a fraction of less than one-half a month, the fraction is disregarded. The age groups, then, are really divided as follows: 18 to 23 months equals 17 months 16 days to 23 months 15 days; 24 to 29 months equals 23 months 16 days to 29 months 15 days; etc.

7. Give each test completely only once. If a child passes a test at one level, he has automatically passed it at all lower levels.

8. If the child passes more than one-half the tests of one age group, give him the tests of the next age group. If he fails any test of one age group, give him the tests of the preceding age group.

9. Space is provided on the scoring blank for recording independently of the age-group divisions the results of the vari-

able-score tests; i.e., those occurring at different age levels. These tests may be given first and evaluated in the various age groups during the course of the examination.

10. The order of the tests within the age groups is one of ranked difficulty. It is not necessary to give the tests in this order.

## CHAPTER NINE

### LANGUAGE TESTS

#### ACTION AGENT TEST

**Material.** The Woodworth and Wells Action Agent Association Test (76), with the items rearranged in approximate order of difficulty, is the material for this test. The material in its rearranged form appears below.

- |              |           |            |              |
|--------------|-----------|------------|--------------|
| 1. sleeps    | 6. burns  | 11. sails  | 16. gallops  |
| 2. scratches | 7. cuts   | 12. boils  | 17. aches    |
| 3. flies     | 8. blows  | 13. floats | 18. explodes |
| 4. bites     | 9. shoots | 14. growls | 19. roars    |
| 5. swims     | 10. melts | 15. stings | 20. mews     |

**Method.** Ask the child, *What runs?* If the child answers correctly, praise him and ask, *What cries?* If this is answered correctly, go on with the printed series, recording after each word the response. It is not necessary to record reaction time. If no response is made after 15 seconds, present the next stimulus word. If the child fails to give the correct response to *What runs?* say, *A boy runs; doesn't he? And a dog runs too. Now tell me what cries.* If this answer is not correct, say, *A baby cries; doesn't it?* and give the child a chance to respond. Then continue, *Do you know what sleeps?* Record the response whether it is relevant or not. Present the whole series no matter what the type of response happens to be.

**Scoring.** Score responses plus if they name :

1. Agent performing act ; i.e.,
  - a. object (such as, " Knife cuts " ) ;
  - b. person manipulating object (such as, " I cut " ).
2. The object of the action, when the verb is interpreted as passive in meaning and its logical object becomes the subject of the statement (such as, " Paper cuts " ).

3. Unusual responses with logical associations ; i.e.,
  - a. when the letter *s* might make confusion (as in *What sails?* the child may interpret the question as "What's sales?" replying, for instance, "For boys' suits");
  - b. other unusual replies (as "Sail, baby sail," or "Sallie," the name of a boat, to *What sails?* or as "Tigers," to *What melts?* — child thinking of the story of Little Black Sambo).

The following examples will further explain the method of scoring :

1. Sleeps
 

*Credited.* Me, I, persons, cows, animals, children, birds, doll ; (*doubtful*) my feet.

*Failed.* Repetition of word, sleepy, that, water, in bed.
2. Scratches
 

*Credited.* Kittie, finger nails, boys, people, animals, scratchy things ; (*doubtful*) my shoe, child shows finger nails, child scratches nail on table.

*Failed.* Scratch somebody, 'squito bites.
3. Flies
 

*Credited.* Birds, airplane, fly, butterflies, chickens, bee ; (*doubtful*) paper.

*Failed.* Ink.
4. Bites
 

*Credited.* Dog, bear, boys, girls, bad things, bees, teeth, mosquitoes, fly, bug ; (*doubtful*) birdies, child uses teeth to bite some object.

*Failed.* Bicycle, bike.
5. Swims
 

*Credited.* Fish, man, frog, people, dog, turtles, kids ; (*doubtful*) boats, to dive, dollie.

*Failed.* Sleep, water, a little baby.
6. Burns
 

*Credited.* Dinner, fire, house, stove, oven, soup, candy, rubbish, paper, teakettle, rags, eggs, matches, hot water ; (*doubtful*) man, things, fire engines.

*Failed.* Bird, horsies.

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7. Cuts
 

*Credited.* Knife, paper, scissors, glass, bread, wood, fingers, saw, ax, magazines; (*doubtful*) robber, cowboys, oranges.

*Failed.* Goat, chairs, cat.
8. Blows
 

*Credited.* Wind, mouth, horn, windmill, bubbles, toot toos, trees; (*doubtful*) balloons, people, boat, tire, fire engine, window, child blows with mouth.

*Failed.* Rows, street.
9. Shoots
 

*Credited.* Gun, pistols, boy, soldier, bullet; (*doubtful*) steam, agates (marbles), wars, the clothes go down the chute.

*Failed.* Cards, shoes.
10. Melts
 

*Credited.* Ice cream, ice, snow, sugar, candy, butter, steel, candle, cocoa; (*doubtful*) tigers (story of Little Black Sambo), sun.

*Failed.* Water, babies.
11. Sails
 

*Credited.* Boat, ship, sailboat, airplane, kites, sailor man; (*doubtful*) paper, flag, for clothes, for boys' suits, men up in the sky, coats.

*Failed.* Horses, sleeps.
12. Boils
 

*Credited.* Oil, carrots, eggs, pot, teakettle, water, stove, steam, chicken, gas, dinner, milk; (*doubtful*) cook, clothes, pigs.

*Failed.* Cat, cut, horses, a sickness, cookies, boys.
13. Floats
 

*Credited.* Boats, wood, fish, sticks, washtub, frog, ducks, a sloop; (*doubtful*) dolls, woman, cats, small, horse's mane, wind, air, flies, sheeps, butterflies.

*Failed.* River, fire, water, raining, rainboat in the sky, skipping.
14. Growls
 

*Credited.* Wolf, dog, tiger, persons, animals, a bow-wow, cow; (*doubtful*) boys, a frog.
15. Stings
 

*Credited.* Bee, fly, bugs, you slap your hand and it stings

- your hand, mosquitoes, spider, worms; (*doubtful*) ball when you throw it, itches, court plaster.
- Failed.* Stings our toes, rats, cow, butterfly, (confusion with "stinks") perfume, an alley, a barn, (confusion with "things") goods, put on.
16. Gallops  
*Credited.* Horses, pigs, cow, hitcher-up, ponies, animals, prince on a horse; (*doubtful*) ladies, boys, girls, doggies.  
*Failed.* Tree, they, alligators.
17. Aches  
*Credited.* Earache, toothache, forehead, stomach, tummy, feet, leg, headache, your body, your finger, your side; (*doubtful*) child points to ear, tooth, etc.; people, people get aches.  
*Failed.* Acorn, cake, bird, ball, pencils, (confusion with "eggs") what chickens make, what you cook, eat 'em, (confusion with "agates") what you shoot.
18. Explodes  
*Credited.* Cannon, electricity, fire crackers, steam, gun, fire, gasoline, powder, bomb; (*doubtful*) stove, boat, house, heater, clocks, ocean, anger.  
*Failed.* Ice box, sheep, swimming, camel, horses, wind, water.
19. Roars  
*Credited.* Lion, horse, dog, cougar, cow, imitation of roaring; (*doubtful*) oil burner, when it's going to rain, drum, snore, soldiers, fire, boiler.  
*Failed.* Doors, fish, cat, roads, (confusion with "rolls") wheels, (confusion with "oars" or "rows") boat.
20. Mews  
*Credited.* Cat, kitten, pussy; (*doubtful*) animals, Tom.  
*Failed.* Moo moo, boxes, gas, dolly, (confusion with music) a fiddle, victrola.

**Discussion.** In the standardization this test was given to children from 24 to 66 months of age. It was soon found not to be adapted to children as young as 24 months and was discontinued at that age. It is a practicable test for

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**TABLE 22**

**MEDIAN SCORES AT SIX AGE LEVELS — ACTION AGENT TEST**

AGE LEVEL (Months)	MEDIAN SCORE (Number of Words)	TEST NUMBER <sup>1</sup>
34.4	6	33
40.9	10	46
46.8	12	58
49.8	13	64
57.5	14	81
62.4	16	86

<sup>1</sup> The test numbers refer to positions given tests in the Merrill-Palmer scale (see pages 228-231).

**TABLE 23**

**PERCENTAGE OF CORRECT RESPONSES — ACTION AGENT TEST**

*(380 Cases)*

WORD	PERCENTAGE	WORD	PERCENTAGE	WORD	PERCENTAGE
sleeps	80	blows	68	stings	35
scratches	80	shoots	65	gallops	39
flies	82	melts	54	aches	29
bites	82	sails	56	explodes	28
swims	78	boils	57	roars	25
burns	74	floats	50	mews	15
cuts	77	growls	43		

children at 30 months, however. Only eight out of sixty-two children in the 30 to 35 month group failed to give one correct response. Failures were easily distinguishable from refusals; a failure at this age usually consisted of repetition of the stimulus words. The total score for the test was the number of correct responses. Median scores at each age level in the standardization group are given in Table 22.

The scores made on the Action Agent Test were found by observation to show some relation to the Stanford Binet

mental age. This observation was verified by the correlation  $r = 0.607 \pm 0.017$  for 157 children from 3 to 6 years of age, inclusive.

The Action Agent Test offers a language test easier than the Stanford Binet Vocabulary and somewhat more difficult than the simple comprehension questions used for our 24 to 29 and 30 to 35 month groups. Children as a rule enjoy answering the questions if they are asked skillfully by the examiner, who should be, apparently at least, enthusiastic about the "game." Responses should be recorded as quickly as possible and no delay suffered by the child, who becomes bored and unresponsive if he has to wait.

As in a vocabulary test, rhymed answers, often without meaning, are given frequently. Some children, usually either very young or dull, tend to show perseveration throughout a series of answers. In such cases, although an answer may happen to be a logical response, it is not credited if the same answer has been used incorrectly for a series of words immediately preceding.

Some children show a wealth of associative trends, naming not only one object but several for each question. This is often evident among superior children but is not limited to that group. Other children tend to talk a great deal about one subject, giving helpful diagnostic clues from their gratuitous remarks.

During the preliminary study of this test it was found that the test as given by Woodworth and Wells was not arranged at all according to difficulty. The result was that when a child was asked, *What gallops?* as the first question, he became discouraged and lost interest in the test. The words were rearranged approximately according to difficulty as indicated by the results of the small group tested in the preliminary study. It was found to be much more conducive to sustained attention to present the easiest words



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first. Table 23 shows the percentage of correct responses for each of the twenty words for 380 cases.

Apparently this arrangement, based upon a small number of cases, is not in exact order of difficulty, but it is sufficiently close for all practical purposes.

### SIMPLE QUESTIONS

**Method.** Ask the following questions one at a time :

1. What does a doggie say?
2. What does a kittie say?
3. What does an automobile say?
4. What is your name?
5. What is this [pencil]?
6. What is it for?
7. What is this [chair]?
8. What is it for?
9. What is this [shoe]?
10. What is it for?

Record each response as nearly as possible as the child says it. If a child does not reply to a question, repeat the question. Record the sounds made by the child in answer to the first three questions in syllables representing them as nearly as possible. Record whatever name the child calls himself. Make no effort to get the last name. If the child does not reply to the question, *What is your name?* ask, *Who are you?* It is usually necessary to ask this question several times before the child answers. When asking about the pencil, hold it up for the child's inspection. Touch the chair, making sure, of course, that the child is looking at it. Take hold of the child's foot and raise it, giving the child an opportunity to look at it. In asking, *What is it for?* vary the question the next time to, *What is a pencil [etc.] for?* and the third time to *What do we do with a pencil?*

As a rule the child makes some response by the time the third question is asked. If he does not, do not urge further

but present the next question. It is usually best to keep the child busy playing with blocks or some chosen object of interest while these language tests are presented. The child's attention is thus momentarily attracted to the question; and when the response is given, his volatile attention again reverts to the blocks. Dissatisfaction with the test and self-consciousness are thus prevented. The objective test is the only one that has more than momentary appeal for a child under 3, and usually for children under 5.

**Scoring.** A discussion of the types of responses for these questions will make clearer the method of scoring used.

1. *What does a doggie say?* The usual correct response to this question is an attempt to imitate the dog's bark or growl. Sometimes the child says, "He barks"; but such superior responses occur but rarely even at 30 months. Other children give an interpretative answer, such as "Go way," or "Keep out." Such answers are scored plus. The usual failure is silence, although a number of children repeat the question or part of it. Some children make other remarks about dogs but fail to answer the question, and still other children make irrelevant comments, which are often obviously an attempt to dispose of a question they cannot answer. A few children jabber an unintelligible baby talk.

2. *What does a kittie say?* The most usual correct response to this question is an attempt to imitate the kitten's mew. Few children attempt to interpret the mew or to name it. Such answers are, of course, acceptable. Failures are either silence, repetition of part of the question, or irrelevant remarks. Some imitative efforts are rather far-fetched but are scored plus if there is an obvious attempt at imitation, as when some children, raising the voice to a high, thin pitch, say, "Ma, ma."

3. *What does an automobile say?* The most usual correct answer is an imitation — an attempt to imitate the

sound of the horn or the engine. Some children give descriptive answers, such as, "A noise," or, "The car blows its horn," and others give an interpretative reply, such as, "Says, 'Let's go run run,'" or "Go on away" — all of which are scored plus. This question is answered less often than any other except *What is a chair for?*

4. *What is your name?* Here the object is to see if the child is able to apply to himself any name at all, other than "baby." In the standardization group only 4 per cent of the 18 to 23 month group gave their full names and 16 per cent gave their first names or a nickname; at 24 to 29 months 29 per cent gave their full names and 25 per cent their first names; and at 30 to 35 months 40 per cent gave their full names and 35 per cent their first names. All these replies are scored plus.

5. *What is this* [a pencil]? There is little confusion with this question. The child either names the pencil or is silent. Few children attempt to repeat the sentence. The only answer credited is a real attempt to say "pencil." The word may be badly pronounced, but it must be recognizable. For example, if the child says only the first syllable, "pen," or distorts the word to "penty," "penpa," etc., the response is scored plus.

6. *What is it* [a pencil] *for?* These questions of use are the most difficult of all. The best answer to this question is, "To write," or, "For write"; some children say, "For you," "For baby," assigning the pencil to some person; and still other children show the use of the pencil in pantomime. All these responses are scored plus. Failures are irrelevant responses, repetition of the question, silence, or repetition of the word "pencil."

7. *What is this* [a chair]? The only satisfactory response for this is the word "chair" or some word meaning chair. Failures are usually silence.

8. *What is it [a chair] for?* The answers to this are necessarily varied. A reply that names a real use is, of course, the best. Such answers are, "For sit on," "For put things on." Other, somewhat inferior, replies that are scored plus are those stating possession — "For me," "Mine," "For people," "Yours," "My seat," "For room." Among children who fail there is a tendency to give irrelevant answers to this question almost as often as to remain silent or to repeat the question.

9. *What is this [a shoe]?* Any word meaning shoe, part of shoe, or foot is scored as correct. The usual failure is silence.

10. *What is it [a shoe] for?* The best answers are those that name a use, such as, "To put on," "For walk," "For wear Sunday," "For my feet," "For button," "For down town," "Men shine." Answers implying ownership — "For me," "For Bobbie" — although somewhat inferior, are also given credit. Irrelevant replies and repetition are almost as usual failures as silence.

*Scoring refusals.* Judging refusals in this test is somewhat difficult. If a child answers any of the questions, failure to respond to the others is always scored as a failure even though it seems more like a refusal. If the child has responded with more or less conversation during the examination, yet refuses to answer any questions at all, the results are counted as refusals. If the child has said nothing during the examination and his vocabulary is obviously very limited, the failure to respond to the questions is counted a failure. As a rule, the child who responds to a part of the questions responds to all of them in such a way that the questions are easily scored as plus or minus.

*Discussion.* The pencil, the chair, and the shoe are most frequently named correctly. Table 24 indicates the comparative difficulty of the questions for the three age groups.

TABLE 24  
PERCENTAGE OF CORRECT RESPONSES — SIMPLE QUESTIONS TEST

QUESTION	AGE GROUP (Months)		
	18-23	24-29	30-35
1	27	55	67
2	16	55	65
3	12	21	37
4	20	54	75
5	39	73	87
6	8	36	54
7	39	71	90
8	2	29	32
9	39	69	92
10	8	19	45

## REPETITION OF WORDS AND WORD GROUPS

<b>Material.</b>	<b>WORDS.</b>	kittie	ball
		birdie	dinner
<b>WORD GROUPS.</b>		nice doggie	See the pretty dollie.
		my nice baby	Give me the big box.

**Method.** Ask the child to say "kittie," and then present the other three single words one at a time. If the child does not attempt to say the stimulus word, urge him to do so, repeating the word several times if necessary, and make every effort to get him to respond. If the child still refuses, repeat the attempt later when the child seems in a more coöperative mood.

After the words have been presented, give the word groups one at a time. Pronounce the words slowly and distinctly. If the child does not reply to the first group, " nice doggie," repeat it and ask him to say it again. Praise attempted responses.

**Scoring.** The score is the actual number of recognizable words repeated or attempted, no matter how poorly pro-

nounced. The dropping of one syllable from two-syllable words is not discounted; "yit," for example, is credited for "little." If the child talks during the examination or if the mother says he can talk, a failure to reply is counted a refusal; otherwise, it is counted a failure. Irrelevant replies or comments about the word instead of an actual repetition of the word are counted as failures.

In the scoring of both words and word groups, one point is allowed for every word repeated; no credit is allowed, however, on any word group of which fewer than two words are repeated. Total scores for the words and the word groups are kept distinct.

**Discussion of single words.** In the experimental group only two children 30 to 35 months old did not repeat all four of these words, and these two repeated three of the four. Repetition of two words is at par value at 22.4 months, and is included in the 18 to 23 month group. Repetition of all four words has a par value at 24.4 months and is included with the 24 to 29 month tests.

There were not many refusals on this test. Occasionally refusals took the form of, "I can't say 'birdie,'" "I can't say 'ball.'" In such cases the child was given credit for repeating the words desired. It was not difficult to obtain the child's interest if his attention was divided; that is, if he had a ball or block in his hand to take his attention from himself. Otherwise the examiner was likely to have a difficult time with delayed responses and refusals. Only slight differences in the difficulty of the various words were indicated. Of the 140 children 118 repeated "ball," 113 "kittie," 107 "birdie," and 102 "dinner." There was frequently baby talk and sometimes jabbering, much of which could not be credited. Some children, on the other hand, talked very distinctly. Some replied "bird" and "dog" when asked to repeat "birdie" and "doggie"; most children,

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however, seemed to respond best to diminutive forms of these words.

**Discussion of word groups.** In the standardization group only 36 per cent of the children under 24 months responded to this test at all. In the 24 to 29 month group 87 per cent responded; and in the 30 to 35 month group most of the children repeated all but one or two of the words correctly and all of them made some response. The last words were most often repeated, and "the" was most often omitted. Sometimes the child added other words to the word group presented. These were counted neither for nor against the child.

If the child had made use of language at any time during the examination or if he was reported as talking to any extent at home, failure to respond to this test was rated as a refusal. There were several such instances encountered. The examiner felt that in some of these cases the refusal was caused by a real inability to do the task, but since this could not be demonstrated these failures were classed as refusals. Frequently refusals were accompanied by some sign of non-coöperation, the child saying, "No," or shaking his head and pouting. As a rule the children who refused this test were those who tended to refuse all tests.

The number of words a child repeats tends to bear a definite relation to his ability to combine words in spontaneous conversation. This relation was observed in a number of cases. Those children whose language development was at a single-word stage repeated only single words; those who could combine words into short phrases had somewhat greater success with the phrases which were to be repeated but tended to flounder when the longer sentences were presented, repeating nothing or simply saying the last word or two; while those children who were able to talk in sentences were able to repeat sentences also.

## CHAPTER TEN

### ALL-OR-NONE TESTS

#### OBEYING SIMPLE COMMANDS

**Method.** Place a box within easy reach of the child near the edge of the low table used for the testing, and place a chair close at hand. Pointing out the objects carefully, say: *See the box. Take the box from the table and put it on the chair.* Praise a successful response. Then ask the child to get a ball, which has been placed on the floor, and to put it in a large open box or cover that can be reached easily by the child. Say: *See the ball. Pick up the ball and put it in this box.* Repeat the commands until the child's attention is gained and he starts the performance of the task.

For the first command use a small empty box which the child has had a chance to open and examine before this test is given. Let him throw the ball and have a brief play with it before he is given the command involving the ball.

**Scoring.** Count as a success the actual carrying out of the command, even though it is delayed by the examination of the box or by other distractions. Score the child's performance as satisfactory only if both commands are executed. If one command is carried out and the other refused, mark the performance as a refusal.

**Discussion.** Occasionally the child is so much fascinated by the objects to be moved that he forgets the command to be executed. In most cases of this sort the second command, involving different objects, is successfully carried out. While being standardized, this task called forth few refusals. Most children complied willingly and without question. This test was usually introduced while the child was wandering around the room playing with the ball. There were no indications that one command was more difficult



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or less pleasing than the other. Of those who performed only one command correctly, as many failed one task as the other.

This test is, of course, not a new one. It has been utilized in many forms in other test series. It was added to this series in an effort to obtain a variety of tasks simple enough for children as young as 18 months.

### THROWING A BALL

**Method.** Give the child a tennis ball, saying, *Throw me the ball.* If he does not respond to this, play ball with him, bouncing the ball and rolling it until he becomes interested enough to attempt to throw it. Give at least three chances.

**Scoring.** Credit as a success any definite fling of the ball by the child in the direction in which it is supposed to be thrown. Score results as plus or minus. Do not credit performance if the ball is merely dropped, rolled, or flung backward.

**Discussion.** This task is a popular one, and it is frequently necessary to use careful strategy to attract the child's interest from the ball in order to complete the test series. It is a helpful test to introduce at awkward moments when the child's interest is found to be lagging, when refusals are increasing, or when it is difficult to establish rapport with the child. A short period of playing ball usually sets the child into merry laughter and makes for better coöperation for the rest of the test series.

The ability to throw a ball appears comparatively early in the child's development. Only one child over the age of 21 months failed this test in the standardization group.

### STRAIGHT TOWER

**Material.** The wooden color cubes used in the Sixteen-Cubes Test are the material used for this test.

**Method.** Pile up the blocks, one upon another, using one block as a base, until you have a structure several cubes high. In the meantime talk of making things with "the pretty blocks," and encourage the child to play with them. After building one or two towers, say to the child: *See if you can make a house like this. See what a high one it is. See how high you can make one* — in the meantime building a tower several blocks high. If the child hesitates, hand the blocks to him one at a time, and encourage him thus, *Put on another. Let us see how high you can make it.*

**Scoring.** The ability of the child to place two more blocks upon a tower which the examiner has started or to build a tower of his own at least three blocks high is the sole basis of determining a satisfactory response.

**Discussion.** Too late for standardization it was discovered that the height of the tower might possibly be used very nicely as an index of development. The method of recording data was altered in the middle of experimentation. At first an attempt was made to see if the child could build a tower three blocks high, and the examiner attempted to time the response. It soon became evident that it was not satisfactory to make this a timed test, and the effort to record the time was abandoned. The timing of a test for very young children is unreliable at best. It is too difficult to get the child to start when one expects him to, and he stops and starts many times. The chief concern of the examiner must be to hold the interest of the child. When the child picked up a block, in this test, it was unpredictable just what he was going to do with it, and when the timing should begin was a question exceedingly difficult to decide. It was felt therefore that results, even of the same examiner for different children, were not comparable.

In the standardization group little difficulty was found in getting the children to play with blocks even at the 18 to 23

month level. Usually they began playing with them at once, and it was easy to start them to building a "house." All but one of the children of this group attempted the test. Concerning the children who failed, such observations as these were made: "Throws rather than places the blocks"; "Can put one block on top of another, but can build no higher"; "Can pick up blocks, but cannot put two on top of the first one"; "Holds one block in each hand, but does not know what to do with them"; "Tower fell over as he placed the third block, each attempt." An analysis of the failures is enlightening. There were only two failures occurring at any age after 20 months. In other words, fourteen out of the sixteen failures occurred in the younger half of the 18 to 23 month group.

The maximum of refusals of this test occurred at 30 to 35 months. Four out of fifty-four children refused. Two out of sixty-two children at 24 to 29 months also refused the test.

#### CROSSING FEET

**Method.** Sit facing the child, who is placed in a chair slightly removed from the table. Say, *See what I am going to do*, crossing your feet at the ankles, and continue, *Let's see if you can cross your feet like that*. If the child hesitates, urge him to try, giving him further demonstrations by crossing and uncrossing your feet.

**Scoring.** If the response is an actual crossing of the feet, record it as plus, but if the child raises or moves his feet in an unsuccessful attempt to respond, or even if he fails to move his feet at all but gives no gesture of unwillingness to attempt the task, record the response as failure. Children often refuse to try, saying, "No," or, "I don't want to." Record such responses as refusals and not as failures.

**Discussion.** In the standardization there was found to be a larger proportion of refusals for this test than for any other. The quantitative results are as follows:

AGE GROUP (Months)	NUMBER OF CHILDREN	NUMBER ATTEMPTING TEST	PERCENTAGE PASSING	NUMBER REFUSING	PERCENTAGE REFUSING
18 to 23	30	19	47	11	37
24 to 29	46	34	79	12	26

Failure, as far as it was possible to analyze it, seemed to be caused partly by the inability to center the attention upon one leg and move it voluntarily. In this respect the test is similar to the Standing on One Foot Test. Another factor that makes this test difficult for extremely young children is the relative shortness of their legs as compared with those of older children and adults.

#### STANDING ON ONE FOOT

**Method.** Ask the child to stand on a spot sufficiently removed from chairs and other objects to prevent his using them for support. Bend one leg at the knee, balancing on the other foot, and say to the child, *See if you can do this.* If the child reaches for a chair or a table for support, lead him away and urge him to try to lift one foot without holding on to a support.

**Scoring.** The slightest raising of one foot is counted a success, no matter how quickly it is set down again. If the child does not respond at once, urge him to try. If he simply stands looking down at his feet and finds himself unable to raise one, count the result a failure; but if he definitely refuses to try, shaking his head or saying "No," count the response a refusal.

**Discussion.** This test seems to show that the young child has some difficulty in relaxing tense muscles at will.

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The child looks at his feet and wishes to raise one, but is unable to make the proper motor response. He can do it easily if he is first allowed to catch hold of some support with one hand. The muscles of one leg can then be relaxed and the foot is lifted with ease. Some children immediately reach for a chair or table, knowing that by such means the task can be accomplished. They are led away from the chair in such cases and urged to try to lift one foot without holding on to a support. The length of time during which a young child can retain this position is necessarily very short. Timing is impracticable. That the foot can be raised at all is the significant fact. One child who refused to do the test was seen practicing alone to see whether or not he could do it.

Because of the length of the test series at 30 to 35 months the test was given only to the 18 to 23 and 24 to 29 month groups in the standardization. It was found to be on the whole an unpopular task, having little intrinsic appeal, and bringing on a mood of self-consciousness which occasionally affected the attitude of the child in the succeeding tests. Consequently, it was usually given last and omitted altogether in cases where the child seemed fatigued.

A brief numerical statement of the results will be of interest :

AGE GROUP (Months)	NUMBER OF CHILDREN	NUMBER ATTEMPTING TEST	PERCENTAGE PASSING	NUMBER REFUSING	PERCENTAGE REFUSING
18 to 23	54	42	28	12	22
24 to 29	47	35	88	12	26

### COUNTING TWO BLOCKS

**Method.** Place one of the colored cubes or a plain inch cube in front of the child, saying, *Here is one block. I have*

*given you one block. Now, I am going to give you another block, and place another cube beside the first. Ask, Now, how many blocks have you? Urge the child to respond, if he does not do so at once.*

**Scoring.** Credit no response other than the word "two."

**Discussion.** The reactions of the children to this test vary greatly. Many of them remain silent. Refusals are frequent. Others begin in counting fashion to name a series of non-consecutive numbers like "three, six, four." Others make irrelevant replies.

The ability to count two appears definitely for the first time in the 30 to 35 month age group. Practically all children of the 24 to 29 month group fail this test. If the child could count two, the examiner went on in the experimental series to see if he could count three, but relatively few children under 36 months could count three blocks.

#### FOLDING PAPER

**Method.** Show a sheet of paper  $4\frac{1}{2}$  by  $5\frac{1}{2}$  inches to the child, saying, *Watch what I do. I am going to make a book. See, I fold it over this way and then press it down like this, and it makes a little book.* Then fold the paper double, and opening and closing it again say, *Isn't that a nice little book? See if you can make a little book out of this paper,* handing to the child a similar sheet of paper.

**Scoring.** If the child does not fold the paper at all or fails to make a crease in the paper so that it retains some trace of the fold when released, score the result as a failure. If the child folds the paper one or more times in any manner whatever, score the response as a success.

Some children crumple the paper into a ball. Score such responses as failures. In successful performances the folds are often made diagonally and are usually uneven. Many children after grasping the idea of folding the paper continue



FIG. 6. Drawing up string.

to fold it, making two or three folds, usually in the same direction as the first. Score such responses plus.

**Discussion.** Many of the children who fail are unable to hold the paper down on the table while they make a fold. They turn the small sheet of paper over and over trying to effect the desired result. A few times are sufficient to discourage the child, and the task, never having much intrinsic appeal, is abandoned. Occasionally a child picks up the paper between thumb and forefinger in a way which might make a fold if the paper were pressed down, but the fold is never creased and no evidence remains of the child's attempt after the paper is released.

In the standardization the number of refusals of this test was fairly high — 8 per cent at 18 to 23 months, 17 per cent

at 24 to 29 months, and 7 per cent at 30 to 35 months — although practically every child of 30 months was able to do this task.

#### MAKING A BLOCK WALK

**Method.** Take one cube from the box of sixteen cubes and tap the table with it, making your hand move along as if the block were taking steps. Make the taps at one-second intervals and with about six inches space between each place tapped. Each time the table is tapped say, *Step*, or *Walk*. After a few steps say, *See how I can make this block walk*, and handing a cube to the child, say, *Let me see how you can make the block walk*. Give the illustration again if the child hesitates.

**Scoring.** Score the response plus if the child taps on the table at least twice and not in the same place both times.

**Discussion.** This test was first introduced because it was observed to be a natural play response of two children at the age of about 24 months. However, the child's conscious imitation of the examiner seems to add new difficulties to the task, with the result that it has a tendency to make the child self-conscious. Frequently children who refuse to attempt this test at the time the task is presented are observed practicing the performance when left by themselves. The number of refusals is large. However, the differentiation between the 18 to 23 month and the 24 to 29 month groups is striking enough to warrant retaining the test in the series in spite of these difficulties.

#### DRAWING UP STRING

**Material.** A piece of soft, heavy string  $3\frac{1}{2}$  yards long, tied to the end of a brightly colored stick (kindergarten counting stick) 6 inches long and  $\frac{1}{2}$  centimeter square in cross section, forms the material for this test.



**Method.** Place the stick at the string's length from a point near the child, and gaining the child's attention, say, *Come on, Stick; come on, Little Stick*, in a coaxing tone, slowly drawing in the string, using both hands. When you have pulled in the stick, hold it up triumphantly, saying, *There's the stick. I made it come to me. Now, let's see if you can make it come to you.* Place the stick again at string's length from the child, handing him the free end of the string, and urge him to try to draw it in. See that the child is standing during this test and that he is free to make any kind of response he pleases. If the response is not a definite attempt to draw in the stick by means of the string, say, *No, that is not the way. Watch me again and see if you can make the little stick come to you*, and again demonstrate pulling in the stick.

**Scoring.** Consider a performance successful if the child is able to decrease definitely the distance between himself and the stick by pulling the string. The actual picking up of the stick is not an essential for success, since the purpose is to test the ability to grasp the idea of pulling in the string.

There are, of course, varying degrees of success. Some children readily grasp the idea and pull the string up immediately with both hands; others use both hands, but only after a second demonstration; still others use only one hand to pull in the string, stooping to the floor and grasping the string, pulling it a short distance by rising and pulling back the arm, then dropping the string and repeating the action. Score as failures all responses inferior to these.

**Discussion.** In the standardization series the differences between the three groups to which the test was given were rather striking. In the 18 to 23 month group only 22 per cent of the children grasped the idea well enough to pull up the string with even one hand. The proportion increased to 66 per cent in the 24 to 29 month group, and to 92 per cent in the 30 to 35 month group.

The percentage of refusals was low enough to warrant the inclusion of this test among those having considerable appeal to the young child. Most of the refusals were made by children who tended to refuse tests in a wholesale manner. Great differences in interest were shown. Some were eager and could scarcely wait until the cord was handed to them, and others had to be urged for some time before they would attempt the task at all.

This test should rank among those tests for young children which tend to show the growing ability to differentiate the use of the two hands. Here it is possible to observe the varying stages of this development. The younger children have no inclination to use both hands. The cord is grasped firmly in one hand and the arm raised backward so that the stick moves slightly nearer the child. The child then strains his arm back as far as possible until he is unable to move the stick any nearer by this method. At this point the response varies. Some children take a step backward, pulling the string around the room; others begin walking forward, sometimes picking up the stick and displaying it with a satisfied smile to the examiner; still others stand still, pulling the string back but not far enough to move the string.

The drawing up of the string with one hand is only an occasional performance and is certainly to be reckoned as inferior to the use of both hands. In the 18 to 23 month standardization group, 13 per cent used only one hand and 9 per cent both hands. In the 24 to 29 month group, 8 per cent of the children used one hand and 56 per cent both hands.

Varying degrees of skill were shown in the use of the two hands. Some children used the one hand merely to hold the cord which the other drew in, while others pulled first with one hand and then with the other. To some the method seemed quite obvious, and to others the task was difficult and was performed awkwardly.

There was only one child out of the 154 children tested who used such an irregular method of moving the stick toward her that it was difficult to score the response. This child moved her arm up and down rapidly, giving a wavelike motion to the string, and brought the stick to her feet in short order. Since the problem presented to the child was to make the stick come to her, this response was scored with the others producing the result with one hand.

The idea for this test was suggested by the questionnaire given by Simon (58), in which he states that the probable age at which a child can pull a cord to him, using both hands, is 18 to 24 months.

#### IDENTIFICATION OF SELF IN MIRROR

**Method.** Show a mirror about 5 by 7 inches in size to the child. Ask, *Look, Who is that?* and continue to urge the child to respond if he is shy. Often the response is an ecstatic exclamation, "Baby!" the child holding the mirror out and smiling at the reflection. In such cases it is impossible to determine whether the child really recognizes himself or whether he thinks it is a picture of a baby. Ask him, *Yes, but what is the baby's name? Who is the baby? What baby is it?*

**Scoring.** Record the child's response as successful only when there is a definite statement or overt indication by the child that he knows the mirrored image is his own. All other responses are scored minus.

Sample notes of successful performances follow:

"My baby," the child exclaimed, and kissed the mirrored image, turning it to see himself in various positions. His mother said that when he got a new suit he spontaneously went over to the mirror and looked at himself.

This child smiled and said, "Baby." When asked, "What baby is it?" she replied, "Kathryn."

Child looked at image silently. After much urging, reluctantly said, "Me."

---

The child pointed at the image, smiled, and pointed to himself when asked who it was.

---

The child said, "I don't know," but continued, "See what I have on my nose," pointing to a little scab she saw in the mirror.

---

This two-year-old replied rather impatiently, "Barbara. You know you can only see yourself."

The following are sample notes of unsatisfactory responses :

Child looked intently at reflection. "Eh, eh," was all he would say.

---

Finally, after the child failed to respond, she was asked, "Is it Margaret?" (the child's name). She replied, "No, it isn't Margaret; it's a baby."

---

"See my baby," was all we could get this child to say.

**Discussion.** In standardizing this test, 4 per cent of the children under 24 months of age actually refused to look in the mirror, and only 28 per cent of the rest could give a definite indication that they knew whose image it was at which they were looking. At two years, however, 67 per cent gave a definitely satisfactory response.

It cannot be said that this is a test of whether or not the child really knows that he sees his own reflection in the mirror. It merely indicates how well he can express to another the fact that he knows whose reflection it is. We may suspect by his actions that he knows, but they have to be definitely indicative before we can state it positively. It is then, at least partially, a test of language development.

#### CUTTING WITH SCISSORS

**Method.** With a pair of blunt scissors cut in two a piece of 8½-by-11-inch typewriting paper. From one edge of the paper again cut a narrow strip, and say, *See how I cut the*

*paper with the scissors. You can have them and cut with the scissors too.* Then hand the scissors to the child and assist him in taking hold of them in a manner suitable for manipulation, giving him the half sheet of paper in the other hand. Urge the child to cut or to try to cut the paper. Any method of holding the scissors to get the desired result is permitted.

**Scoring.** Score the results according to the ability of the child to make a long cut — i.e., to open and close the scissors several times to make a continuous cut across the paper — or to make a short cut or gash in the paper involving only one opening and closing of the scissors. Some children prove quite adept at the latter, making a fringe around the edge of the paper, but are unable to continue cutting in the same place. Score either of these results as plus. Score all inferior attempts as failures.

Typical failures at this age include merely pointing the scissors at the paper, holding the wrong end of the scissors, and manipulating the scissors but failing to manage the paper with the other hand.

**Discussion.** Relatively few children refuse to try this test. Nearly all are fascinated by it, and some of them insist on trying for a long time to work out the method.

Interesting personality factors are brought out in this test. Some children work persistently and methodically. Others try a short time and then push the scissors away in distaste for their failure, or hand the task to their mothers or to the examiner to do.

In the 18 to 23 month level of the standardization group only two children refused to attempt the task. Of the remaining children only 10 per cent were successful in cutting at all, and none could cut a strip of paper. Most of the children who were successful used both hands in manipulating the scissors, pushing one of the blades under the edge of the paper and closing it down before the paper slipped out.



FIG. 7. Cutting with scissors.

Several children in the 24 to 29 month group who found they could not cut the paper tore it to get the result they desired. Sometimes the child worked at the task until he became much irritated. On such occasions the tearing seemed to relieve his feelings; whether he actually thought he was successful is hard to say, but he appeared to think so. One child tried very hard, then announced, "Oh, they can't cut," and handed the material back to the examiner. Four of the five refusals at this age were from children who also refused most of the other tests. Occasionally a withdrawing from the scissors and an apparent fear of them were noticed in children whose parents had frightened them with the scissors in order to keep them from being hurt by the sharp points. Many mothers explained when the scissors were presented, "I never give my child scissors to play with.

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I'm sure he can't do it." Most of these children were persuaded to try, especially with the parent coöperating in urging the child to do so. There were only two children in the 24 to 29 month group who could cut a strip of paper, while seventeen children of that age could cut gashes or fringes in the paper.

There is a rather striking improvement of the 30 to 35 month group over the 24 to 29 month group. Of the fifty-four children in this group who were given the test, four refused it, and 32 per cent of the remaining fifty could cut strips of paper. The rapid appearance of this ability might lead one to suspect that this test is simply one of maturity. Yet defective older children who rank below 30 months in mental development have consistently failed in this test. There were two elements to be considered in this performance: the manipulation of the scissors — opening and closing them at the proper time; and the handling of the paper — slipping it into the proper opening between the two blades of the scissors at the right time for cutting. The task thus involves a differentiation in the movements of the two hands which is too difficult for children of 24 to 29 months. The majority of children at this age seem to be able to open and close the scissors. The act is so difficult, however, that the other hand is often observed making rudimentary movements of a similar nature, and the facial muscles are set in motion — the mouth open, the tongue sometimes protruding. The result is that when the attention is shifted to the lifting of the paper with the free hand and adjusting it in the scissors ready for cutting, the scissors are closed by the other hand and the difficult process of opening the scissors has to be done over again, with a parallel result when the attention is again shifted to the paper.

This inability to perform different movements with the two hands at the same time seems to be characteristic of

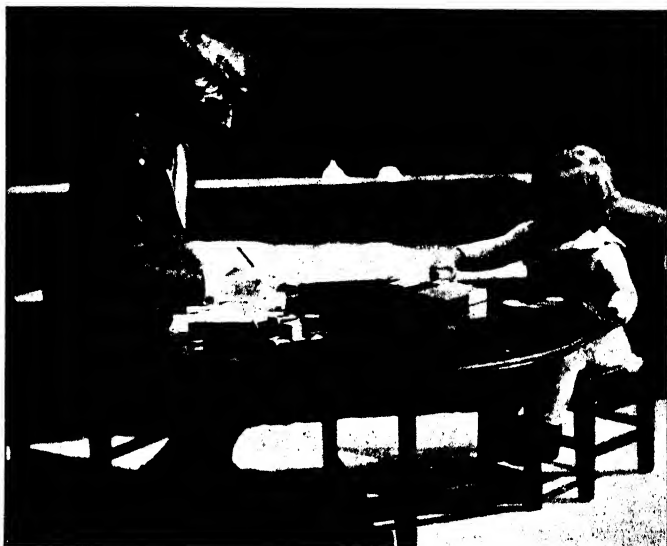


FIG. 8. Matching colors.

the child under 36 months. Cutting with scissors is the test in the series most strikingly involving this ability.

In the preliminary study the driving of a nail seemed to involve this ability. Children of 24 months could often pound well with a hammer, using one hand, or they could hold the nail in place ready to drive it, but when they attempted to coördinate the tasks, the result was that they were either unable to pound with one hand, or to hold the nail in place with the other.

#### MATCHING COLORS

**Material.** The test material consists of four small boxes, like those used by druggists for capsules, each box of a different color — red, yellow, green, or blue. Each box contains



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six disks  $1\frac{1}{4}$  inches in diameter, of the same color as the exterior of the box.

**Method.** Open one box, remove the six disks, and spread them before the child, saying, *See what pretty little balls these are; let us spread them all on the table here.* Open another box, remove the disks from it, and mix them with the others, continuing, *And look here; this box has some different ones in it.* Similarly, open the other two boxes and remove their contents. Shuffle the disks thoroughly; place the four open boxes within easy reach of the child and arrange them so that the color of each open box is distinctly seen by the child.

Then say, *Now, see if you can put the little balls back into the boxes where they belong.* If the child hesitates or fails to get the idea, continue, *See, this one is just the color of this box; so it goes right in here. And this one is the color of this box; so it goes in here.* Continue the demonstration until one disk of each color is placed in its corresponding box.

Then say, *Now, you put each little ball in the box where it belongs,* taking care that the child picks up just one disk at a time. If he places it in the wrong box, correct his error, saying, *No, this is just the color of this box; so it goes in here.* Then continue the placing until there are two disks of each color in the box of the same color. At this point allow no further illustrations. Give the child an opportunity to place the disks as he pleases without having his attention called to errors or having any remarks made on his performance other than such comments as, *Fine. That's good,* when the child is succeeding, or, *Go ahead now; put them all back in their little boxes,* when he begins playing with the disks and loses the idea of the test objective.

**Scoring.** Score the results according to degree of success. More than two errors in any color make that color a failure; that is, the child must succeed in placing two disks

in each box correctly. If such errors occur for more than two colors, score the whole test a failure.

**Discussion.** This test involves at least two totally different abilities; i.e., the ability to discriminate color differences, and the ability to comprehend the task of sorting the disks into boxes according to color. These two abilities are not always concurrent. At 18 to 23 months in the standardization group it was frequently impossible to tell whether or not the child could discriminate color differences. The children usually picked up the disks indiscriminately, placing all or nearly all of them in one box. Some children picked out a few disks of the same color but could not grasp the idea that they were to be placed in the corresponding box. At 24 to 29 months the children performed the task somewhat more intelligently. Very often they started right, picking out similar colors and putting them in the corresponding box after careful instruction by the examiner, but the task was too long for their powers of attention and they soon placed the colors as indiscriminately as the younger children did. Those children who succeeded in scoring a complete success usually had lapses of attention during which colors were wrongly placed in spite of an obvious ability to tell them apart. Sometimes these errors were corrected, but more usually they were not.

In the cases of partial success in the 24 to 29 month group, red was always placed correctly, blue was failed but once, yellow was placed correctly once, and green was failed by all. In the 30 to 35 month group, the children were able to do this task with at least partial success in 74 per cent of the cases. The explanation was unnecessarily long and complete for many of the children of this age group; most of them grasped the idea of the task at once. Only a few of those children who were able to do the task at all showed errors through inattention. Of the three children who

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received partial credit, one child failed red only, one child failed blue and green, and one failed green only. In the 36 to 41 month group only 22 children were tested, but the results for these 22 were striking in comparison with those of even the 30 to 35 month group. There were no failures, no refusals, and only one partial success. Of the children at this age level such observations as the following were made by the examiner: "Did not have to show him," "Caught on right away," "Used a system. Gathered all of one color in one hand and put them in the correct box." There was no longer any question as to the child's ability to differentiate color. It would have been possible to make a timed performance of the test at this age, since the differentiation between children was entirely on the basis of the dexterity with which the colors were sorted and placed in their boxes.

### CLOSING FIST AND MOVING THUMB

**Method.** Place your right hand in front of the child, resting your elbow on the table. When you are sure of the child's attention, close your hand, holding the thumb straight up, and say, *See how I can make my thumb wiggle. Now, first shut your hand just as I do. Now, see if you can make your thumb wiggle like mine.* Record the hand used by the child and the degree of success.

**Scoring.** If the child succeeds in holding all his fingers still, with the hand remaining closed, while he moves his thumb, score his performance plus. If any of the other fingers move along with the thumb, whether it is only a slight movement of the index finger or a more pronounced motion of the whole hand, score the performance minus.

**Discussion.** The child's choice of the hand to be used in this task is in many instances undoubtedly suggested by the examiner, who always illustrates the action with her right

hand. In the standardization group the percentages using the right and left hands were as follows :

	2½ YEARS	3 YEARS	3½ YEARS
Right hand	72	90	68
Left hand	19	10	25
Both hands	9	0	7

The ability to move the thumb independently while the fingers are all held motionless appears rather suddenly at about 33 months. This is not a popular test, but most children respond to it with tolerance. Some children are much amused by the test, and others are definitely embarrassed by it. There is a fairly high percentage of refusals even among the older children.

The idea for the test was obtained from watching the nursery school children attempt finger plays involving this task. Here it was observed that the younger children had great difficulty in keeping their fingers still while they moved their thumbs.

#### OPPOSITION OF THUMB AND FINGERS

**Method.** Face in the same direction in which the child is facing, so that when you extend your own right hand it is in the same relative position as the child's right hand. While you spread your fingers wide apart, holding your hand with the palm facing the child, say: *Now, watch me carefully and see if you can do this. Hold your hand out like this and keep your fingers wide apart.* If the child does not spread out his fingers, make sure that he does so before continuing, as follows: *Now, touch your thumb to each finger this way.* Illustrate this slowly, beginning with the index finger. Touch the thumb with the tip of each finger, and repeat the act two or three times, and then say, *Now, you do it.* When the

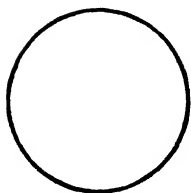


FIG. 9. Material for the Copying a Circle Test.

child begins with the little finger and touches each one in order, tell him to try again and to begin with the first finger, which you point out to him. Give three trials.

**Scoring.** Only the touching of all four fingers in succession is regarded as successful; the fingers have to be separated from one another at the time one is touched to the thumb. Note whether the right or left hand is used by the child. Score the test as passed if the child is successful in two of the three trials. In order to receive credit for a trial, he must begin by touching the index finger and proceed in regular order to the little finger.

**Discussion.** Since in the standardization there were only three successes in the first group of fifty children between 24 and 36 months and all these children were over 30 months of age, the test was discontinued for these ages. Thirty-five per cent of the children in the 36 to 41 month group and 50 per cent of the children in the 42 to 47 month group passed the test.

Since the examiner presented the right hand to the child, it was to be expected that the majority of children would use the right hand, and 78 per cent of them did so; 14 per cent used the left hand, and 7 per cent both hands.

While this test has a high correlation with chronological age in normal children, it seems to offer rather interesting possibilities in work with defective children. Failure in the test by older children seems to indicate defective motor coördination. While the number of feeble-minded children who have been given this test — thirty-four — is rather small, the twenty-eight who had a mental age of 42 months or more were all successful, and the six who had a mental age of less than 42 months were all unable to perform the task.

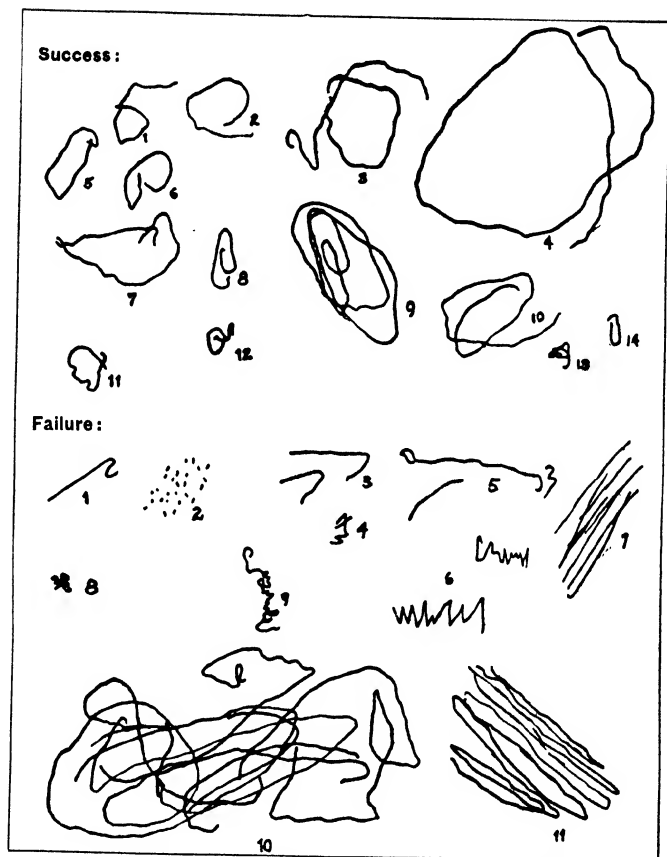


FIG. 10. Scoring Card for the Copying a Circle Test.

The task was suggested by the experiment of Elizabeth C. Foote (21); her method of presentation was much more complicated, however, and the test more difficult than that used in the present study. Miss Foote's study was made

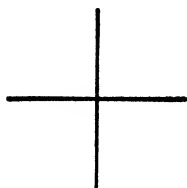


FIG. 11. Material for the Copying a Cross Test.

with both normal and defective children, but no normal children less than 60 months old were tested. The hands were placed in six different positions during the thumb-finger opposition. Only 55.5 per cent of the defectives with a mental age of 60 months and 60 per cent of the normal children of 60 months were successful in all six moves.

#### COPYING A CIRCLE

**Material.** A circle 1 inch in diameter, drawn on a 3-inch square of white cardboard, is the material for this test (see Figure 9).

**Method.** Place the cardboard square in front of the child, one edge touching the piece of blank paper on which the child is to make his copy. Give him a pencil and instruct him thus: *See how nicely you can make one just like this. Make it right here.* Give three trials. Praise each attempt liberally and then cover it up with the cardboard or another paper before asking the child to begin a new trial.

**Scoring.** Score the efforts leniently. If the child is obviously trying to make a circle and has some idea of how to go about it, score the result plus. It makes no difference if the two ends are not quite united, or if a number of extra loops and angles are included, or even if the child, momentarily interested in the activity alone, goes around several times before he stops. A sample scoring card has been made of different types of success and failure for guidance in judging responses (see Figure 10). Most of these are taken from the younger age groups. There are few partial successes. As a rule older children draw very presentable circles, the scoring of which is not difficult.

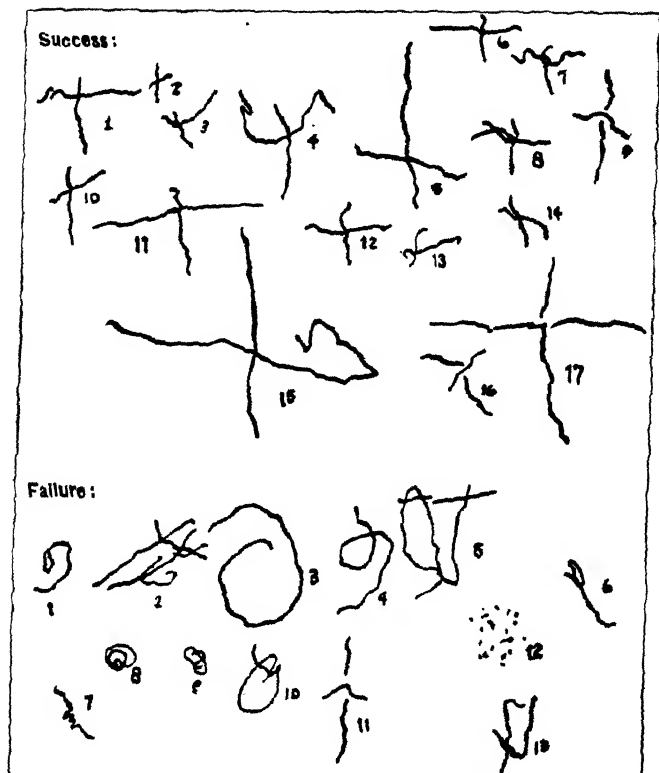


FIG. 12. Scoring Card for the Copying a Cross Test.

**Discussion.** No child under 2 years in the standardization group could copy a circle, only 31 per cent of the children under 3 could do it, and 53 per cent of the children between 36 and 41 months of age were successful.

The method of administering this test is somewhat different from that used by Kuhlmann (40). It is probable that



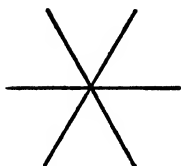


FIG. 13. Material for the Copying a Star Test.

had there been a demonstration of the drawing of a circle to aid the child in realizing what was desired, there would have been a greater proportion of success in the younger groups. Many children are unable to grasp the idea of reproducing the circle on another piece of paper and start to mark on the sample until the examiner deters them. In the administration of these copying tests, the method used by Terman in the Copying a Square Test has been followed. The results, then, yield a comparable set of tests for different ages.

#### COPYING A CROSS

**Material.** A cross consisting of two moderately heavy lines 1 inch long, bisecting each other perpendicularly, drawn

TABLE 25

ANALYSIS OF SUCCESSES IN COPYING CIRCLE, CROSS, AND STAR

	AGE GROUP (Months)								
	13-23	24-29	30-35	36-41	42-47	48-53	54-59	60-65	66-71
<b>CIRCLE</b>									
Number of children .	57	70	77	72	54	55	52	70	55
Percentage succeeding in 3 of 3 trials . .	0	7	31	53	81	94	100	100	100
<b>CROSS</b>									
Number of children .	57	70	77	60	53	56	53	68	54
Percentage succeeding in 3 of 3 trials . .	0	0	0	10	49	48	87	100	96
<b>STAR</b>									
Number of children .	57	70	77	60	54	55	54	51	67
Percentage succeeding in 1 of 3 trials . .	0	0	0	0	0	11	47	70	72
Percentage succeeding in 3 of 3 trials . .	0	0	0	0	0	2	22	53	54

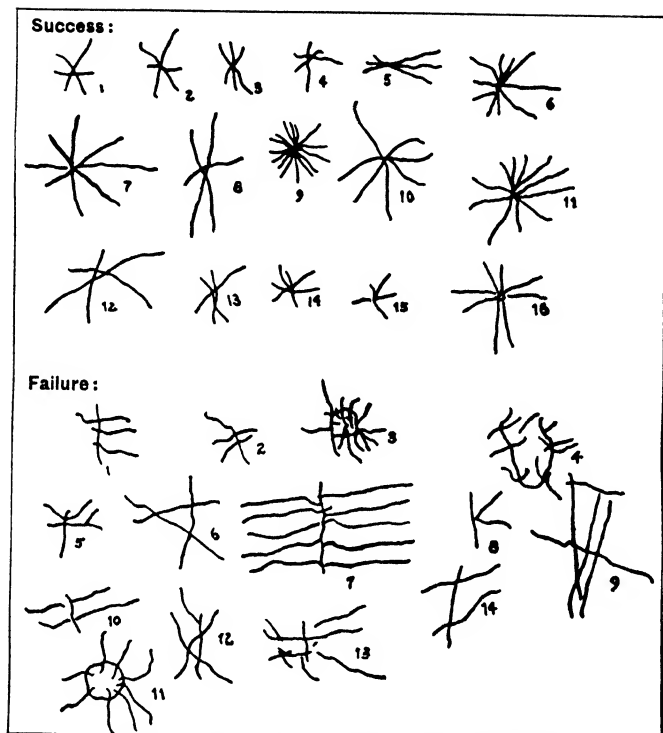


FIG. 14. Scoring Card for the Copying a Star Test.

on a 3-inch square of white cardboard, is the material for this test (see Figure 11).

**Method.** The method is the same as that used in the Copying a Circle Test.

**Scoring.** Make allowance in scoring for slips of the pencil due to motor incoördination. If the result is obviously an attempt to copy the cross, no matter how crooked the lines or uneven the angles, score it as a successful attempt.

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A scoring card is of great aid in the judging of questioned cases (see Figure 12).

**Discussion.** This test shows a striking rise in ability with increasing age. In the standardization series no child under 3 years could do the task, while at 3½ years half the children were successful (see Table 25).

### COPYING A STAR

**Material.** A star, consisting of three 1-inch lines bisecting each other at angles of 60 degrees, drawn on a 3-inch square of white cardboard, is the material for this test (see Figure 13).

**Method.** The method is the same as that used in the Copying a Circle Test.

**Scoring.** Here again score the results leniently and use a scoring card in judging doubtful cases. As can be seen from the scoring card (Figure 14), the drawing considered as successful is one indicating that the child has the main idea of a number of lines radiating from a center that is not too large.

**Discussion.** In the experimental series this task proved to be too difficult for 3-year-old children. No child under 4 years of age succeeded in copying even one star. In the 48 to 53 month group the proportion of successes in one of three trials was only 11 per cent, while in the 54 to 59 month group 47 per cent were successful (see Table 25).

## CHAPTER ELEVEN

### FORM BOARDS AND PICTURE TESTS

#### SEGUIN FORM BOARD

**Material.** The Seguin Form Board in which all the insets are level with the board — the type standardized in the Pintner-Paterson series of performance tests (51) — is the material for this test.

**Method.** Remove the forms from the board and then place it on the table before the child, the lower edge even with the edge of the table nearest the child. Place the blocks in three piles on the table near the upper edge of the board with no block in the pile nearest its recess, the lozenge and elongated hexagon in different layers, and the Greek cross and star on the bottom layer. Follow this arrangement at the beginning of each of the three trials. Say: *Let me see how quickly you can put these blocks into their places.* Hold the child's attention to the task at hand by suitable comments. Avoid speeding-up methods. Instructions to hurry give some young children a sense of haste which tends merely to divide their attention, while for others such instructions have no meaning whatever. If the child fails to get all the blocks placed correctly during the first trial, call his attention to the blocks that he has succeeded in placing correctly, saying, *See how nicely these fit; now put the rest in like these.* Urge the child to continue the task until he gives up, refusing to try longer. Administer praise freely for successful effort. Whenever it is necessary to call the child's attention back to his undertaking, hand one of the unplaced blocks to him with some such request as this: *Let's see if you can find the place for this one.* If it is necessary to hand several blocks in succession to the child to maintain his interest, take care to select blocks whose places on the board are not adjacent.

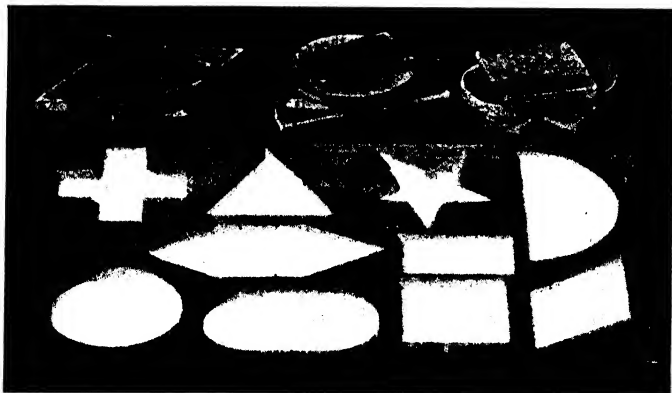


FIG. 15. Seguin Form Board.

If the child fails to place the blocks or to grasp the idea of the test and simply piles the blocks on top of the board, place the blocks correctly in the recesses to show the child where they belong and count the first trial a failure. Give no further demonstration after the first trial; even if the child refuses to work further without definite assistance, that trial is counted as a failure. Usually errors are self-corrective — if a piece cannot be placed in the recess, it is obviously not the right one; but occasionally a child discovers that a small piece will go into a larger hole and leaves the error uncorrected. If the error is not discovered during the test and most of the other pieces are placed, remove the wrongly placed block unobtrusively, permitting the child to go on with his trial-and-error method unhampered by the fact that some of the errors are self-evident and others are not.

Give the child three trials in which he is encouraged in every way to make the best record of which he is capable. Except in the instances noted, at no time touch the blocks

to aid the child in placing them; but if the board is sliding on the table, hold it firm.

**Scoring.** Time each of the three trials with a stop watch, and record the number of false moves made by the child for each trial. False moves include any effort to put a block in the wrong place. If a block is set on the right place, attach no penalty to failing to get it down in its place; attach no penalty to holding a block poised above the wrong place. Only actually touching a block to the wrong place is counted as an error.

Two different measures of success are used for this test — the time for the best trial and the total number of errors made in all three trials. The time for the best trial is scored at the following levels:

AGE LEVEL (Months)	TIME SCORE (Seconds)	TEST NUMBER
33.0	222	31
37.9	109	36
44.3	72	49
48.2	63	60
55.7	48	77
62.4	39	86
69.0	35	93

The second type of evaluation is based on the total number of errors for all three trials. The lowest diagnostic point in this type of scoring is success in two out of three trials. If the child makes so poor a showing at the first trial that the test has to be demonstrated to him, the first trial is counted a failure; and if one trial is a failure, the number of errors for all three trials cannot be scored. However, the number of trials in which a child is successful is one measure of achievement. The median performance of the 30 to 35 month group is two successful trials out of three. This degree of success is found to be at par at 31.5 months

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(Test No. 24).<sup>1</sup> The total number of errors, as stated before, cannot be given unless all three trials are completed. The first age at which a median error score is possible is in the age group 36 to 41 months. Here the median error score is 28, at the age level of 38.7 months (Test No. 41). Errors seem to be diagnostic also in the 42 to 47 month age group, where the median error score is 9, at the age level of 44.3 months (Test No. 50).

**Discussion.** Though it was planned to administer and score the test according to the Pintner-Paterson directions, it soon appeared that several modifications were necessary to make the method suitable for use with younger children.

The results at first were analyzed by time required for the first trial, time required for the best trial, total time required or sum of the three trials, and sum of errors for all three trials. An analysis of results, however, indicated that one measure of the child's performance on the three trials was inadequate to express the actual result and that quantitative measures often hid significant trends in the results. Some children were of an excitable, active type, making a large number of errors, but finishing in a relatively short time; while others were slow and plodding, having no sense of haste but making relatively few errors. Some children who were very stupid in understanding the test, taking a long time and making many errors in the first trial, showed a surprising ability to learn the task, decreasing the time and errors in a marked degree with each successive trial. Other children showed just about the same performance on all three trials, and still others grew progressively worse with each trial.

This test was found to be of practical value with children as young as 30 months. It was given to twenty-eight children

<sup>1</sup> Test numbers given throughout this section indicate the positions of the various tests in the Merrill-Palmer scale. (See pages 228-231.)

of the 24 to 29 month group, but only two children were successful in all three trials, and only three children succeeded in one trial. The test was discontinued in this younger age group because of the fatigue resulting from the time and effort required. At 30 to 35 months 69 per cent of the children were successful in at least one trial.

An interesting tendency among the younger children was the failure to realize that each block would fit only one hole. Finding that a block went nicely into one hole, they wished to remove it and try it in other holes to see if it would fit them as well. The best way to deal with this tendency was to let the child take the piece out and find out for himself the characteristics of the material with which he was dealing.

The test reveals to an amazing extent the inferior perception of form young children have and their failure to comprehend the characteristics of the material with which they are working. As a rule, children under 42 months proceed almost entirely upon a trial-and-error basis. The number of errors is usually large and the time required long. Often much can be learned of the child's adaptability and learning capacity from the method used in solving this problem. He seems to start the task with so little knowledge of the material with which he is working that an excellent opportunity is offered to study him in his mastery of the problem. The method of solution used by some children is to place a block in a recess and then to push or pound. The idea back of this action seems to be that if one pushes long enough and hard enough the block will change its shape and go in. Much emotion is worked up by persistent adherence to this method after it fails to work. Many children soon discover that this is not successful and alter the method. Unnecessary movements are indulged in if by chance they aid once in a solution. Sometimes the younger children place some of the



pieces correctly and then wish to empty them out before all the pieces have been placed. This is not permitted.

The types of errors made vary with the age of the child. Younger children make indiscriminate errors. The easiest block to place is the circle; it offers least resistance and fits the right hole any way the child happens to place it. Yet often the younger children try even the circle in such obviously incorrect places as the recesses for the star and cross before they find the correct recess. The older children know more about form. After the trial-and-error stage is over, there appears a stage in which the child makes errors by confusing certain forms. Such confusions are made with the square and the circle, the oval and the semicircle, the oval and the elongated diamond, the star and the cross, the square and the rectangle, the triangle and the diamond, and the elongated diamond and the diamond. The older the child, however, the less common are these errors. At 5 years the children usually make errors only through inattention and haste, and these are not many. At this age the child makes most of his judgments visually, without actually fitting the piece to the wrong hole.

Interesting lights on the child's personality and training are often obtainable. Children differ greatly in the amount of complaining at failure and of irritation at continued resistance to pushing. One child worked for two minutes to get the cross in the recess for the diamond and then wept bitterly at his failure. He had to be encouraged before he was willing to go on with the test. Another child kept fretting, "I can't. I can't. You put them in for me." Some children threw the blocks across the room in fits of ill temper; and one child, who used the trial-and-error method and did not seem to learn by experience, taking longer for the second trial than for the first, had a temper tantrum. Notes on one child stated, "Did not understand, had to be shown.



FIG. 16. Mare and Foal Picture Completion Test.

Good judgment shown in second trial, however. Efforts not particularly absurd. Much inclined to be upset over failure to succeed at once." Occasionally a child refuses to repeat the test. Often dull children work patiently, displaying a cheerfulness and evenness of temper which in a measure compensate for the lack of ability shown.

The test brings out striking contrasts between the bright and stupid children of the younger groups. Often the brighter children are so fascinated by the test that they insist on a fourth trial. These children show an ability to avoid errors once discovered, to alter their methods, and to decrease the time markedly on each successive trial. Some examples of rapid learning follow :

First trial was a failure, and the child was shown where the pieces belonged. He caught on quickly. In the second trial he made twenty-one errors and took 195 seconds. On the third trial he made only one error and took only 58 seconds. This child was fascinated and insisted on a fourth trial.

First trial was done with seventeen errors in 150 seconds; the second with eight errors in 90 seconds; and the third with three errors in 64 seconds.

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A slower type of learning was shown by the following children :

First trial, thirty-one errors in 197 seconds; second trial, sixteen errors in 191 seconds; third trial, one error in 75 seconds.

First trial, six errors in 171 seconds; second trial, five errors in 172 seconds; third trial, one error in 55 seconds.

To facilitate comparison, these individual records are all taken from the 30 to 35 month group.

These may be contrasted with the following records of children of the same group :

First trial, 545 seconds with twenty-five errors; second trial, 349 seconds with twenty-eight errors; third trial, 473 seconds with fifteen errors.

First trial, 237 seconds with fourteen errors; second trial, 457 seconds with twenty-one errors; third trial, 233 seconds with twenty-one errors. This child persisted in trying to pound each block into place.

Other children of the same age are quick from the first, as these records will show :

First trial, no errors, in 65 seconds; second trial, no errors, in 65 seconds; third trial, no errors, in 52 seconds.

First trial, five errors, in 77 seconds; second trial, seven errors, in 105 seconds; third trial, one error, in 63 seconds.

Among the older children those who are clever with the test usually work rapidly with fairly low scores at the start; others take a long time on the first trial and show a marked decrease in both time and errors for later trials but are not at any time able to compete with the former group in speed.

### MARE AND FOAL PICTURE COMPLETION

**Material.** A Mare and Foal Picture Completion Board, like that used in the Pintner-Paterson series of performance tests (51), is the material for this test.

**Method.** Place the Mare and Foal Picture Board in front of the child, with the seven pieces scattered at the right side of the board. Say to the child, *Put these pieces in the right places as quickly as you can.* Start the stop watch as the child picks up the first piece. Record the time taken for a complete performance, and the number of errors.

Regard as an error any attempt to place a piece in the wrong space, whether it is left there or not. Holding a piece poised over a wrong space without bringing it down to touch the board is not counted an error. The method of administration is much the same as that used for the Pintner-Paterson standardization of this test, with a few modifications to suit the younger ages. Because some pieces of the test are self-corrective, since they fit into one space only, while others can be maneuvered into incorrect spaces, a wrongly placed piece is removed unobtrusively and without comment when it becomes evident that the child does not notice the error. Otherwise, touch the pieces to be placed only when one of them has become caught in a hole and the child is trying unsuccessfully to remove it. If encouragement is necessary to maintain the child's interest, praise is given when a piece is placed correctly. There is no time limit for the test.

**Scoring.** The time taken for the child to complete the test is the only score. Mark the test as passed at each of the following levels of which the median time score is equal to or in excess of the time score made by the child :

AGE GROUP (Months)	MEDIAN TIME SCORE	APPROXIMATE AGE LEVEL (Months)	TEST NUMBER
36-41	317	39.4	44
42-47	208	46.0	57
48-53	150	50.4	67
54-59	93	57.0	78
60-65	86	65.6	90

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**Discussion.** At first the scoring was done on the basis of both time and errors, but the correlation between the two was found to be so high, especially in the younger age group ( $r = 0.752 \pm 0.045$  for the age group 36 to 44 months), that the error score was discontinued. In this test the younger children used a trial-and-error method for the most part. They took a long time and seemed to have difficulty in realizing that there was just one position in which each piece would go. Many of them worked for long periods with the correct piece for the space but had it upside down and failed to realize the difficulty. In the 24 to 29 and 30 to 35 month groups the task was very trying. It proved to be somewhat more difficult than the Seguin Form Board. In the course of giving this test to twenty-four children of each of these age groups, it was realized that the test placed too great a strain upon them, and it was therefore discontinued at these ages. In the 24 to 29 month age group no children were successful, while in the 30 to 35 month group 20.8 per cent were successful. In this test there is a rapid decrease in both time and errors with increasing age, except for the 60 to 65 and 66 to 71 month age groups.

This test holds great interest for the preschool child. As a rule the children work at it with persistence and energy and in the course of the test often exhibit many of their personality tendencies.

### MANIKIN

**Material.** The Manikin Puzzle Test used in the Pintner-Paterson series is the material for this test (51).

**Method.** The Pintner-Paterson method of administering and scoring is followed. Place the body of the Manikin on the table in front of the child, the arms and legs on either side and the head on the extreme right (see Figure 17). Place the leg with the rectangular end at the opposite side

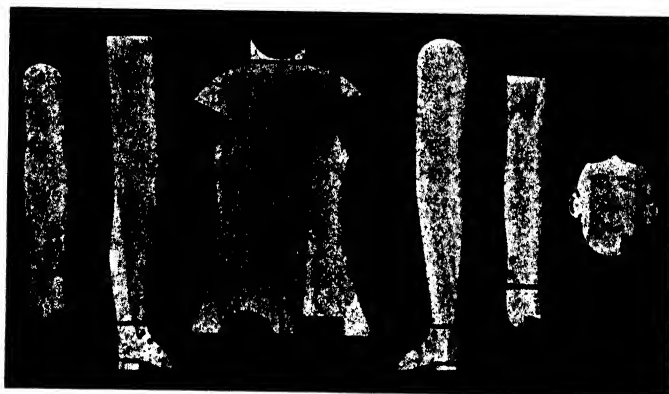


FIG. 17. The Manikin.

of the body from that where it fits, and place the other leg and the two arms in similar relation. Say, *Put this together as quickly as you can.* Make no mention of the fact that the figure represents a man. If the child picks the pieces up and tries to put them together above the table, tell him to put them together on the table. No penalty is attached to placing the pieces with the picture side down.

**Scoring.** Score the test according to the following plan :

- 5 points.* Complete performance, entirely accurate.
- 4 points.* One or both arms up or out ; i.e., not exactly fitting the joints.
- 3 points.* One reversal ; i.e., right arm for left arm or vice versa, or right leg for left leg or vice versa.
- 2 points.* Two reversals ; i.e., both arms and legs reversed.
- 1 point.* Legs or arms interchanged or arms at sides of trunk, or any other result that looks like a man.
- 0 point.* Failure to see that the figure represents a man.

The test is scored at three different age levels in the Merrill-Palmer scale, as follows :

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MEDIAN POINT SCORE	APPROXIMATE AGE LEVEL (Months)	TEST NUMBER
1	48.5	61
2	53.1	73
3	69.0	92

**Discussion.** This is a difficult test for the preschool child. In the 42 to 47 month age group only 37 per cent of the children score as much as one point. Even for those children who have some measure of success the test holds surprisingly little interest. Few volunteer to repeat the test, and few seem to take any pleasure in handling the pieces or attempt other feats with them as they do with the Mare and Foal Test and other more popular tests. Often the children recognize that the parts of the test are those of the figure of a man, and make comments about the face, arms, and other parts, but when asked to put them together, give one push with each hand, moving the pieces so they touch but remain in the same relative position as when presented, and look up with an expression of satisfaction at having completed the requested task.

### PICTURE PUZZLE NO. 1

**Material.** The picture "Mother's Own," by Jessie Wilcox Smith, mounted on three-ply wood and cut into two pieces, as in the illustration, is the material for this test.

**Method.** Place the two pieces of the puzzle on the table in front of the child with the irregular, cut edges nearest to him. Then say, *See how nicely you can put these together.* Start the stop watch as soon as the child touches the puzzle and stop it as soon as the puzzle is correctly put together, whether or not the child has removed his hands.

**Scoring.** The time taken for a correct performance is the



FIG. 18. Picture Puzzle No. 1.

only method of recording the quality of success. If the child attempts to put the pieces together in the air, tell him to leave the pieces on the table while he puts them together. Give no time credit for failure or for a success taking longer than 14 seconds.

**Discussion.** In the standardization the test was found to differentiate the younger age groups nicely. There was a striking difference between the 30 to 35 month and the 36 to 41 month groups. The test was found to be diagnostic at three age levels: 36 to 41 months, with a score of 14 seconds as a maximum; 42 to 47 months, with a maximum score of 4 seconds; and 48 to 53 months, with a score of 3 seconds or less.

#### PICTURE PUZZLE NO. 2

**Material.** The picture "Playing Mother," by Jessie Wilcox Smith, mounted on three-ply wood and cut into three pieces, as in the illustration, is the material for this test.

**Method.** Place the pieces in the order 1, 2, 3, with piece 1 on the child's right and the corners containing the numbers turned to the lower right. Then say, *See how quickly you can put these together.* Take the time from the instant the child touches the pieces of the puzzle until the last piece is placed correctly. Refrain from making comments while the child is working on the puzzle. It is necessary to avoid any word or facial expression that may aid the child in cor-



recting an error. If the child insists on an answer to a question, give him a noncommittal one or simply say, *Now, I am going to see if you can do this all by yourself. Go ahead and see how nicely you can do it.* Do not touch the puzzle unless a piece is about to fall off the table. Praise is helpful in getting the child to work hard on the next puzzle, but it is necessary to administer this praise carefully since it may easily become a device for aiding in the solution of the puzzle. Only after a piece is correctly placed and the child has indicated in some way that he is aware that it is correctly placed, should his effort be praised.

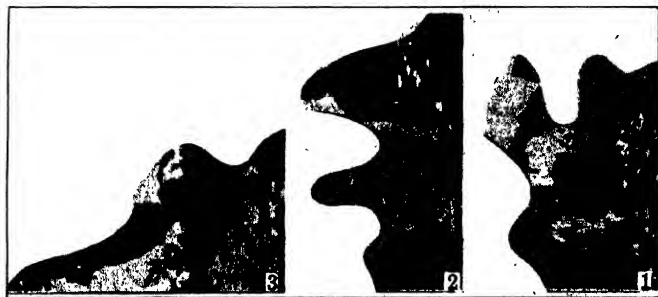


FIG. 19. Picture Puzzle No. 2.

**Scoring.** Picture Puzzle No. 2 is scored at two age levels; i.e., at 48 to 53 months with a time limit of 46 seconds or less, and at 54 to 59 months with a time limit of 22 seconds or less. Score as a failure any performance taking longer than 46 seconds.

**Discussion.** It is most satisfactory to time the test up to the point at which the child succeeds in completing the puzzle. If the timing is continued until the child removes his hands from the test material, children having a tendency toward neatness and carefulness of performance are penalized. In standardizing this test, an attempt was made to count

errors, but it was found to be too difficult to determine when one error ended and another began.

### PICTURE PUZZLE NO. 3

**Material.** The picture "Off to Play," by Jessie Wilcox Smith, mounted on three-ply wood and cut into four pieces, as in the illustration, is the material for this test.

**Method.** Place the pieces in the order 1, 2, 3, 4, with piece 1 on the child's right, and the corners containing the numbers placed farthest away from the child. Do not allow the child to touch the puzzle until the pieces are arranged. Then say, *See how quickly you can put these together.* The method of administration is the same as for Picture Puzzle No. 2.

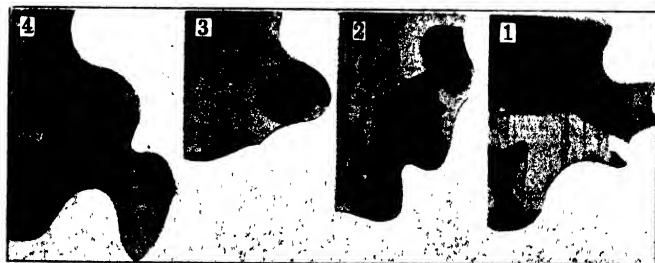


FIG. 20. Picture Puzzle No. 3.

**Scoring.** There is no time limit for this test. Score it simply as passed or failed, as Test No. 71.

**Discussion.** This picture puzzle is somewhat more difficult than Puzzle No. 2. It differentiates the older age groups poorly as far as time scores are concerned, and so it has been discarded as a timed test and scored on the basis of successful performance.

**Discussion of picture puzzles as tests.** Just what proportion of children utilize the picture as a guide to the solution of

the picture puzzles cannot be determined. Often it is evident that the child is influenced chiefly by the shape of the pieces rather than by the picture content. Sometimes there are expressions of surprise when the picture is completed. As a rule the children make comments about the content of the picture, and the fact that there is a picture to be completed adds much to the interest. In the standardization no children turned any of the puzzle pieces over and tried to place them without regard to the picture. The making of the picture serves as an objective even when color and shape elements in the picture offer no clues to its solution. The importance of this element of interest with young children cannot be overemphasized. Here the incentives of a display of skill, competing with time, and comparison with others are effective to only a slight extent. The factors that induce coöperation and desire for effort are the inherent interest the test may have for the child, the amount of glamour the examiner is able to cast over the test material in presenting it, and the pleasure the child takes in the undivided attention of the examiner. By far the greatest of these is the degree in which the test object itself appeals to the child. Given a task lacking in color interest and having a monotony of form, such as the Pintner-Paterson Triangle Test, it is exceedingly difficult to secure persistent effort from a young child. The mere fact that the triangles have to be turned over to fit in their places correctly, and that there is no clue as to which is the right side, makes this a very difficult task for 4-year-olds. Picture puzzles with the pieces having straight lines and thus lacking an irregular shape as a clue are likewise exceedingly difficult for the young child. His interest may be maintained in such a test, but the result is likely to be a failure because the test is not self-corrective and the child is usually too uncritical to discover his mistakes.

DECROLY MATCHING GAME

**Material.** The material for this test, the Matching Game No. 3 of the first series of the Decroly Educative Games, consists of a set of four large cards, 13 by 18 centimeters, each card containing four silhouette pictures in red, and a set of sixteen smaller cards, 6½ by 9 centimeters, made by quartering a duplicate set of the large cards (see Figure 21). The sixteen silhouette pictures represent a star, crescent, cherry, disk or ball, triangle, pear, sailboat, sprinkling can, lamp, square, pitcher, locomotive engine, apple, basket, flag, and umbrella.

**Method.** Place the four large cards in a row in front of the child, with the bottom of the cards nearest the child. Then spread the small cards on the table below and on each side of the row of larger cards so that each picture is visible.

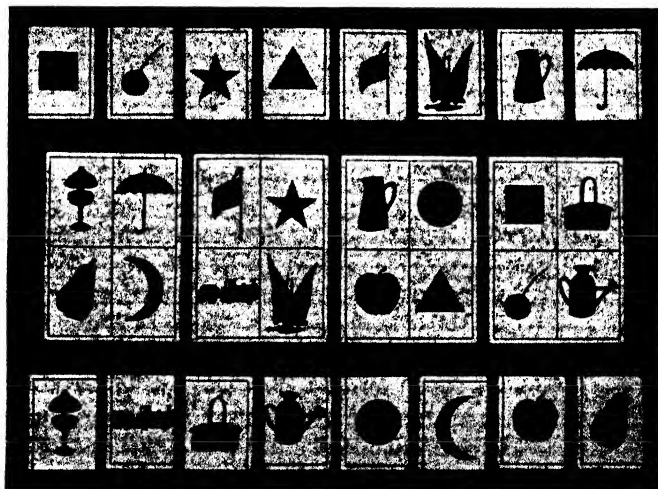


FIG. 21. Decroly Matching Game.

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This system of arranging these small cards need not be observed exactly, but the ball should be placed immediately in front of the child below the large cards and the small cards should not be placed contiguous to the pictures they match on the large card.

The instructions are as follows: *Do you see these pictures [pointing to the large cards]? Each one of them has another picture among these [pointing to small cards] which is exactly like it. Let us see how quickly you can put the two pictures together, the little card on the big one.* If the child does not understand, continue, *Show me the ball. Good, now find me a ball among these. That's right, now put this ball on top of the other ball.* If the child does not place the ball correctly, show him where it belongs. Continue, *Now, find the other pictures that are alike and put them together, the little card on top of the big one.*

Time the response. Start the stop watch immediately after the first card is placed if the child grasps the idea at once, but if the illustration of the ball is needed, start the watch as soon as the child picks up the next card after placing the ball. Record the number of cards correctly placed and a statement of whether or not the ball illustration was necessary. Give no further assistance after the illustration of the ball.

**Scoring.** If the child has to be shown where to place the ball, do not count this placement. If he places one picture incorrectly and places the right picture over it, count the effort as a failure; but if the correct picture is placed first and an incorrect one placed on top, count the first picture correct. Give one point for each picture correctly placed.

The results are evaluated on the basis of the sum of points — one for each picture correctly matched — up to twelve, and a time score is kept for those cases in which the point score is twelve or more points. This method of scoring has

been adopted because it was found that if a child grasped the idea and was able to hold it for any length of time he usually made at least twelve correct placements.

The test is diagnostic at five age levels. At 42 to 47 months the median score of three cards correctly placed is at par at 45 months. Four cards correctly placed is at par at 51.4 months. In the standardization, children in the age group 54 to 59 months showed such decided improvement that twelve cards were correctly placed in a large majority of cases. A time score at this age and beyond seems to offer a better means of differentiation; 217 seconds is the median time score for this age group, 160 seconds for the 60 to 65 month group, and 133 seconds for the 66 to 71 month group.

**Discussion.** Because of the low percentage of successes in the age groups below the 42 to 47 month group, the test was discontinued below this age level. It was too much of a task for the younger children and tended to prolong the test period in an uninteresting way.

Failures were occasioned not so much by inability to identify the pictures, or even to point out that there were two alike, as by inability to understand that they were to be matched — the two similar pictures to be placed together. Sometimes the child seemed to have grasped the idea and started out to match the pictures, only to have this idea merge into the objective of placing the small cards on the large ones in a haphazard arrangement. This confusion accounts for the large number of low scores in the 42 to 47 and 48 to 53 month age groups.

As a rule this test afforded interesting occupation to the older children. Even when they failed to do more than pile the small cards on top of the large ones, they seemed to enjoy seeing the pictures and handling the cards. Only one of the children refused to attempt the test. He was 36 months old.

## CHAPTER TWELVE

### OTHER TESTS OF MOTOR COÖRDINATION

#### WALLIN PEG BOARDS

**Material.** Peg Boards A and B of the Wallin series (72) are the material for this test.

**Method.** The method of administering these tests is similar to that used by Wallin. Seat the child at the low table used for the whole test series, in such a position that he can see the holes in the boards. Present one board at a time, first Peg Board A, then B. Remove the pegs in full view of the child and place them in a row on the table near the middle of the side of the peg board nearest the child. Give the child no aid in the test other than letting him see the examiner remove the pegs. Say, *See if you can put them back in their holes*, pointing to the pegs and then to the board. If the child does not grasp the idea, continue motioning from pegs to board and saying, *Put them back*. Place no special emphasis on the speed with which the test is to be done. These young children are not influenced favorably by such an emphasis. It is necessary to praise the successful placement of pegs and to keep the child's attention on the task by such comments as, *That's fine; now put another in*, modifying the type of encouragement to fit the temperament of the particular child. A successful trial consists of a perfect performance; i.e., all the pegs placed in the board.

**Scoring.** If the child does not place all the pegs in the board, allow no time score. The number of pegs placed in the holes is not counted unless all are placed. If, after the child has worked a long time, he fails to get all or any of the pegs in and refuses to work longer at the task, call the performance a failure. If the child succeeds with the first trial, give three trials with each board.

**Discussion.** These peg boards are exceedingly popular.

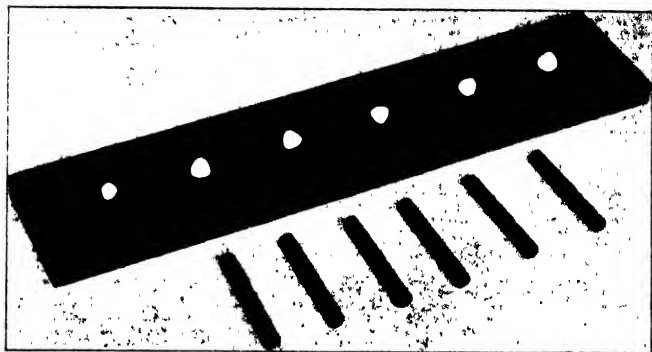


FIG. 22. Wallin Peg Board A.

The percentage of complete refusals is small, though children of 18 months often rebel at the second and third trial for Peg Board B, which is very difficult for them.

It can be seen that Peg Board A is a suitable test for children as young as 18 months. In the standardization series 50 per cent of the children of the 18 to 23 month age group did this task in 38 seconds or less for the best trial. It differentiates sufficiently well among the older age groups to be included as Test No. 15, best trial 25 seconds, which is at par at 26.5 months; as Test No. 28, best trial 20 seconds, at par at 33 months; and as Test No. 38, best trial 17 seconds, which is at par at 38.4 months.

Peg Board B presents a more difficult task. It is too difficult for the average child of the 18 to 23 month group. It is first included as Test No. 16, as the median performance for children of the 24 to 29 month age group, best trial 41 seconds, and is at par at exactly 27 months. It is also included as Test No. 26, best trial 27 seconds, at par at 32.6 months; and as Test No. 45, best trial 23 seconds, at par at 40 months.



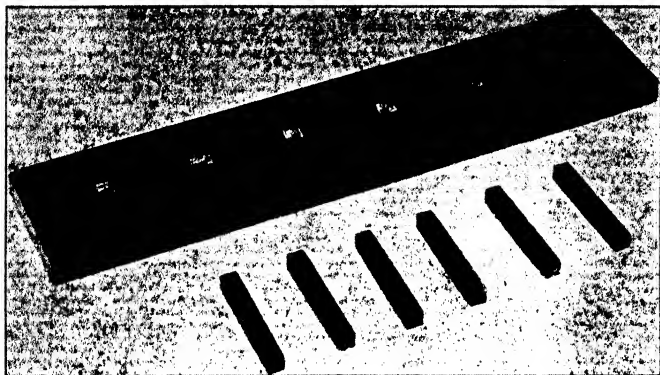


FIG. 23. Wallin Peg Board B.

Wide differences are shown in the position of the best trial. The first trial is almost as likely to be the best one as is the second or third; children of these early ages are easily distracted or are likely to attempt at any point in the performance innovations in method which may add to the time score.

Because of the popularity of these two tests, the ease of giving and scoring, the number of clues to personality they reveal, and their diagnostic value, they are two of the best tests for children of the younger age groups.

#### FITTING SIXTEEN CUBES IN A BOX

**Material.** A box of sixteen color cubes<sup>1</sup> is the material for this test.

**Method.** The sixteen cubes are first shown in the box to the child. Say, *See the pretty blocks; let us empty them all out.* Then empty the box on the table. Encourage the child to manipulate the blocks without direction for a time.

<sup>1</sup> Manufactured by the Embossing Company, Albany, New York.

Often the examiner may take this occasion to see how high the child can build a straight tower. Allow the child to get over the first period of delight in the blocks — a period in which he tends to play aimlessly with them, pushing them around on the table and starting to carry out one idea only to be distracted by another. After the child has played in this fashion for a short time, say, *Now, see if you can put them back in the box*, and put one or two in if the child hesitates. Start the stop watch when the child places the first block. If the child piles blocks on top of others, say, *No, put them down in the box, like this, so the cover will go on*, pointing to a block correctly placed; and if the child does not grasp the idea then, put the cover on top of the box to show the child that it cannot be shut while the blocks remain on top. If, after this demonstration, the child still does not grasp the idea of what is wanted, urge no further.

It is necessary to supervise the child's efforts closely and to keep his attention constantly on the task; otherwise in most instances the child will place a part of the blocks and then will quickly remove them before all are put in, and carry on an endless performance of placing some in and taking them out again. Be ready to keep the child's attention from straying by handing him a block, saying, *Here's another one to put in*, and keep him from removing the blocks by saying, *No, put some more in; put this one in*. Frequently children remove one block to find place for another. Permit this without comment. Usually this method is a successful one, since in removing one block the child tends to shove the other loose blocks nearer together, thus making a larger space in which to place the others.

**Scoring.** Allow no credit for time unless all sixteen of the blocks are placed so that they rest with one side flat on the bottom of the box. Do not count blocks projecting above the top of the box as correctly placed. If the child

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does not place all sixteen cubes, score him on the highest number of cubes placed in the box at any time during the test.

This test is scored at three age levels. A score of 13 or more cubes in the box is placed as Test No. 8 and belongs in the 18 to 23 month age group. The next level of performance is Test No. 14 in the 24 to 29 month group, with a time score of 125 seconds or less for placing all sixteen of the cubes in the box. If the child fails to place all sixteen cubes correctly in the box, do not record the time. If the child takes longer than 125 seconds to place all sixteen cubes, give him credit for Test No. 8, in the first age group, and score Test No. 14 as failed. The highest level of performance is Test No. 25, with a time score of 100 seconds for placing all sixteen cubes in the box.

**Discussion.** In the 18 to 23 month group of the standardization series only one child refused this test. Of the children tested only 35 per cent placed all sixteen of the cubes in the box. Typical responses at this age are throwing or dropping a few cubes in, placing some in and then removing them, and placing all in that will go and piling the rest on top. There is a tendency to push straight down with the block held in the hand; if the other blocks make way for the one in the hand, well and good; if not, the block is left on top. At this age level very few children have the idea of pushing blocks over with the free hand to make room for those still remaining to be placed.

In the 24 to 29 month group of the standardization series there was only one refusal, caused by a particular set against the test. Of the children tested, 80 per cent were able to place all sixteen cubes in the box. A method of attacking the problem generally superior to that of the younger children was apparent in this group. The time taken was much shorter as a rule, and the effort involved was not so great. The methods



FIG. 24. Fitting sixteen cubes in a box.

used by children who made low time scores varied. Some children placed the blocks methodically in rows, one after another; others picked up several blocks at a time, pulling them up and pushing the blocks over to make room for others, approaching the task without any apparent plan other than to crowd the blocks all in as fast as possible. Both kinds of responses were successful, and the time taken by one was often no greater than that taken by the other. The children who were slowest in attaining success were the inattentive children who put part of the blocks in, lost the

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purpose of the test, and emptied the blocks out again; and the children with very poor motor coördination, who had difficulty in turning the square blocks to make them fit.

In the 30 to 35 month group of the standardization series there were three refusals — that is, 4 per cent of the children tested; 30 per cent of the others were able to place all sixteen cubes in the box. The increased ease of performance of this group was marked. At this age level many of the children had the idea of pushing one block over with the free hand to make room for the block to be placed, a response seldom observed in younger children. This response appears to be related to the ability to coördinate the use of the hands in different phases of the same activity.

As can be seen from the small proportion of refusals (see Table 20), children do not object to this task. Most of them love it. They are fascinated by the blocks, object to leaving them when they are all placed, want to repeat the performance, and often revert to it, demanding "that box" again.

### NEST OF CUBES

**Material.** A nest of hollow cubes,  $2\frac{1}{4}$  inches, 2 inches,  $1\frac{1}{4}$  inches, and  $1\frac{1}{4}$  inches, respectively, in size, is the material for this test.

**Method.** Show the nest of cubes to the child and then take it apart, calling the child's attention to the process, placing the separate cubes on the table with the open ends up, in the arrangement shown in the illustration. Before allowing the child to have the cubes, put them together in the correct nest arrangement, making sure that the child is attending carefully to the process. The order of demonstration is to place the smallest cube in the next larger, and these two in the next larger, and all three in the largest cube. Talk to the child in some such manner as this: *See,*

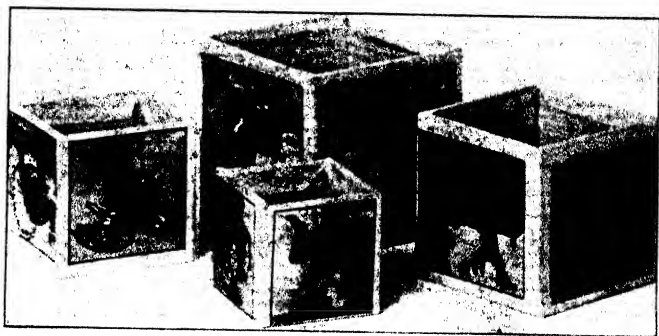


FIG. 25. Nest of Cubes.

*this one will go in here, and this one goes in here, and this one goes in here, and then we put this one in here, and they all fit together like this. Now, we take them apart and put them on the table again. Then separate the cubes again and arrange them in the order shown in the illustration, directly in front of the child. Continue, Now, you put the boxes together just as I did. Start the stop watch the instant the child touches the cubes preparatory to arranging them. Suggestions as to method are permissible only during the demonstration and are not necessarily confined to any formula. Make the test as interesting and as intelligible to the child as possible without actually doing it for him.*

**Scoring.** Score the result by time for a correct performance. Record order of arrangement when the cubes are not correctly placed. Allow no time credit for an unsatisfactory performance. Count time scores of over 250 seconds as failures.

If all the cubes are nested together, with none of the three smaller ones projecting outside the fourth, consider the result a success, even though one or more of the cubes is turned in the wrong direction

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The test is scored at two age levels — 250 seconds or less for the 24 to 29 month group, and 30 seconds or less for the 30 to 35 month group.

**Discussion.** These young children, even those under 24 months, grasp the idea of the test readily. As a rule failure is due solely to inability to judge size and to manipulate the corners of the cubes so that a smaller cube will fit into a larger one. Many children try for a long time to accomplish this task. Some grow impatient and lay the task aside, and others leave the cubes in a wrong arrangement, apparently satisfied with their performance. Some children go at the task with great vigor, pounding, forcing a solution, thus almost wrecking the hollow cubes, and often failing because of this uncontrolled strength; while others feebly try once or twice to fit the pieces together and then leave them. Some children fail simply because of inability to turn the cubes around so that they will fit, while others work for a long time trying to force the large box into the tiny one, sometimes fretting because they cannot make it go in. In fact, in addition to the clues to the child's motor ability given by this test, there are usually interesting glimpses into his personality.

In the experimental group only a few of the children had similar blocks at home, and not all these children were successful in the test. Of the nine successful children in the 18 to 23 month group, only two possessed similar blocks.

### BUTTONS AND BUTTONHOLES

**Material.** The material for this test consists of three pairs of 3-by-6-inch strips of pink flannelette — one pair with a button  $\frac{3}{4}$  inch in diameter on one strip and a buttonhole  $\frac{7}{8}$  inch long on the other; and the second and third pairs with two and four buttons, respectively, and the corresponding buttonholes. Take care to see that the buttonholes do not become too large for the buttons by the

continuous stretching process involved in the use of the material. Whenever this occurs, sew the buttonholes together at the ends until they slip over the buttons easily without being too loose.

**Method for one-button strip.** Present the one-button strip only to children under 36 months of age. Show it first to the child with the button fastened through the buttonhole. Talk to the child in this fashion, as you demonstrate the possibilities of the button strip: *Look what we have here, a button; and see how it comes unbuttoned. Then we can button it again this way. We just push the button through the hole and pull it like this, and then it is buttoned. See? Now let's see if you can button the button like that.* Then unbutton the strip and place the two pieces of cloth in front of the child, button on the left and buttonhole on the right. Give encouragement to the child by such remarks as, *You are doing fine; you'll get it done soon*, whenever it is felt to be necessary. Avoid comments as to method.

**Method for two-button strip.** Present the two-button strip to children of 30 months or over. If the one-button strip is to be done, present it first; and if the four-button strip is to be done, present it after the two-button strip — i.e., always present the strips in the order of difficulty.

First show the two-button strip buttoned, so that the child can see what it looks like in that condition. Then unbutton it and place the two strips before the child, the buttons on the left and the buttonholes on the right, as you say, *Let me see how quickly you can button these.* It should be noted that the method of presenting this strip differs from that of presenting the one-button strip only in that the buttoning of the two-button strip is not demonstrated. Begin the timing the instant the child touches the button strips with the intention of buttoning them. Use the same type of encouragement as with the one-button test. If one of the





FIG. 26. Buttons and Buttonholes.

buttons comes unfastened while the child is buttoning the other, take it for granted that he should attempt to button it again; the time values take account of this type of performance. Many children do not get the first button entirely through the buttonhole before they start on the other button, and consequently all the effort expended on the first one is wasted. This type of failure is more common with the younger children than with the older ones. In case the child does not realize that he should rebutton the button which has come unfastened, call his attention to it.

**Four-button strip.** Administer this test in the same way as the test with the two-button strip. First show the buttons in their buttonholes, then unfasten them and place the strips before the child. Attach no penalty to twisted strips of cloth, provided all the buttons are buttoned in the right order.

**Scoring.** These button tests supply ten diagnostic levels of performance in the test series.

The One-Button Test is scored as an all-or-none test at 30 to 35 months. In the standardization series it was found that 72 per cent of the children of this age group

were successful, as compared with 19 per cent in the next lower age group. The test was at par at 30.5 months (Test No. 22). Score the test as a successful performance if the child succeeds in buttoning the strip, and encourage him to continue working as long as there seems any probability of success.

The Two-Button Test is scored as a timed test with the following diagnostic levels of performance :

AGE GROUP (Months)	MEDIAN TIME SCORE (Seconds)	APPROXIMATE AGE LEVEL (Months)	TEST NUMBER
30-35	170	33.0	30
36-41	50	38.8	42
42-47	34	44.6	52
48-53	30	49.5	63
54-59	23	54.7	75
60-65	19	61.0	84

The Four-Button Test is scored as a timed test with the following diagnostic levels of performance :

AGE GROUP (Months)	MEDIAN TIME SCORE (Seconds)	APPROXIMATE AGE LEVEL (Months)	TEST NUMBER
42-47	76	45.2	55
48-53	51	50.8	69
54-59	42	57.9	83

Score the two- and four-button tests as failures if the child does not completely button the strips, or if he takes longer than 170 seconds for the Two-Button Test or longer than 76 seconds for the Four-Button Test, even if he completely buttons the strips.

**Discussion.** These buttoning tests have a surprising amount of interest for the young child, and there are relatively few refusals. In the 18 to 23 month group no chil-



FIG. 27. Little Pink Tower built up.

dren have been successful in buttoning even the one-button strip. As a rule they have little idea as to how to go about buttoning it. Often they hold one piece in each hand and never put the two together. Some try to pound or press the button through, often with the buttonhole underneath or not directly over the button. Some of the younger children attempt to pull off the button.

With the older children one often feels that the only difference between failure and success in this task is one of persistence. Some of the children work only a short time, then finding the task difficult, push it aside, saying, "I can't do them, you play with them," or, "I can't do it, I'm going to put them away."

One child worked with great zeal, tongue out, and against odds, saying occasionally, "Oh, Bobby will button it"; and, sure enough, he succeeded in 169 seconds. Another child exclaimed with a burst of pride as she pulled the second button through and straightened the strip in 72 seconds, "That's pretty good."

#### LITTLE PINK TOWER

**Material.** The five small blocks of the Montessori Pink Tower are the material for this test.

**Method.** The method of giving this test is the same as that for the large pink tower of ten blocks, as standardized by Woolley and Cleveland (78). After building the Little Pink Tower behind the screen, place it in front of the child, and say, *See this pretty pink tower. See how it is built with the biggest block at the bottom, then the next biggest, and on up*

to this little baby block at the top. Do you think if I knock the tower down you can build it again just the same way, with the big block on the bottom and the little block on the top? Whatever the response, knock the tower down, taking care to have the blocks near together in easy reach and thoroughly mixed. Then tell the child, *Now go ahead*, and allow him to build the tower without assistance or comment other than, *Good*, or a nod or smile if he seems to need encouragement. If the child has placed the blocks incorrectly, ask him — after the score has been recorded — *Does that look right to you?*

**Scoring.** Start the stop watch as the child touches the first block preparatory to building the tower. Number the blocks in order of size from 1 to 5, and record the order of placing in case of failure. When the child is successful, record the time in seconds. The performance is not a success unless the blocks are placed in the right order.

This test is included at the following levels:

MEDIAN SCORE (Seconds)	APPROXIMATE AGE LEVEL (Months)	TEST NUMBER
33	38.6	40
22	44.5	51
17	50.6	68
14	53.6	74
10	63.0	89

**Discussion.** The fact that there is no model to copy makes this task difficult. The child has to retain the image of the object he is trying to copy. This leads to some peculiar responses. Some children arrange the blocks in a row on the table, forgetting that they should be built into a tower. Others build the tower but have no hesitation in putting a large block on top of a smaller one as long as it will balance easily. One type of failure among the younger groups which may be significant is an effort to build the tower upside

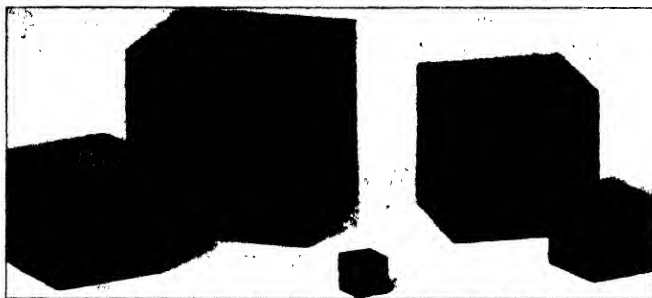


FIG. 28. Little Pink Tower as presented to the child to build up.

down. As a rule the child does not get beyond the third block with this error; a few recognize the difficulty and, discarding the small block as a base, start with the large block. An analysis of the failures in the 30 to 35 month group shows eighteen different arrangements of the blocks. The most usual failure is a confusion of the two largest blocks.

#### THREE-CUBE PYRAMID

**Material.** Six 1-inch cubes, all of one color, are the material for this test.

**Method.** With three of the cubes build a pyramid (see Figure 29) on the table directly in front of the child, leaving enough space between the model and the edge of the table for the child's copy. Say as you work, *See what I am making. I wonder if you can make one just like it. Make it out of these and make it right there*, first pointing to the other three blocks which are placed on the table to the child's left and then to the space immediately in front of the child. Start the stop watch as soon as the child picks up one of the cubes to start his building. Do not permit the child to destroy the model pyramid if it can be avoided; say emphatically, *No, you make one like this; make it out of these*,

*right here*, pointing out again what the child is to do. Stop the watch as soon as the child has achieved a pyramid, whether or not he has removed his hand from it. Careful children, who want the block just so, are otherwise penalized for their accuracy.

**Scoring.** Count only a real pyramid as successful. The degree of space between the cubes is immaterial, as long as the third block is balanced on top of the lower two.

The age at which this task can first be done at all is somewhere within the 30 to 35 month group.



FIG. 29. Three- and Six-Cube Pyramids.

There are four age groups through which the time score recedes rapidly. The median score for each age group is taken for the diagnostic point. These points are 17 seconds, at 33.0 months; 11 seconds, at 39.0 months; 9 seconds, at 43.6 months; and 7 seconds, at 48.7 months.

**Discussion.** The comprehension of directions, the motor coördination requisite to placing the blocks in the correct position, and the ability to analyze where each block belongs are some of the requirements for success in this test. All

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normal children of 54 months and over have these abilities, and the chief point of differentiation in their individual performances is the rapidity with which they set about their task. This factor, taken alone, is too much dependent upon chance environmental conditions and upon personality factors to be of any diagnostic value. The test differentiates younger children somewhat better than it does older ones — sufficiently well, in fact, to save it from the all-or-none class.

### SIX-CUBE PYRAMID

**Material.** Twelve 1-inch cubes, all of one color, are the material for this test.

**Method.** Always present the three-cube pyramid before presenting the six-cube one. With six of the cubes build a larger pyramid (see Figure 29), saying as you work, *Now, see what I am going to make this time, a bigger one. I wonder if you can make one like this. Make it right here, out of these [pointing to the space in front of the child and to the other cubes]. Make it just like this one.* Do not permit the child to tear down the model if this can be avoided. Start the stop watch as soon as the child picks up the first cube preparatory to building and stop it when the last cube is placed, even if the child has his hands on the structure, adjusting it more carefully.

**Scoring.** A successful attempt to copy the pyramid consists in getting the blocks placed in three layers, three blocks on the bottom layer, two blocks on the next, and one block on top of these two. The amount of space between the blocks does not matter. Some children leave none. Younger children frequently tear down the model. The building of two straight towers side by side and the building of two three-cube pyramids are common types of failure.

**Discussion.** This proves to be a surprisingly difficult task as compared with that of building the three-cube

pyramid. The first age at which a median time score is possible occurs between 48 and 53 months. Only one child under 3 years was able to make this six-cube pyramid.

Children seem to find enjoyment in this test, but it is not so popular as the Little Pink Tower or the Mare and Foal Test. Imaginative children sometimes proceed to build other things when they have completed the assigned task. They invariably enjoy replacing the cubes in their brightly colored box.



## CHAPTER THIRTEEN

### COMPUTATION OF TOTAL SCORE AND USE OF NORMS

#### SCORING THE TEST

THE ninety-three test items are ranked according to difficulty. To the left of each item on the scoring blank is a pair of brackets in which to record the score. An asterisk before a test item indicates that the test appears in no older age group.<sup>1</sup> Variable-score tests — i.e., those occurring at different age levels — do not skip age groups. Each variable-score test is found in each age group from the group in which it first appears to the group in which it last appears. All-or-none tests appear but once in the test series. Each of these is starred.

1. The score for each test item should be one of the following four symbols: plus (+) for success, minus (−) for failure, *O* for omitted, or *R* for refused.

2. If a child's score on a variable-score test is equal or superior to the score value of that test at the age level at which he is being scored, mark the test plus at that level. If the test is not starred at that level, compare the score with the score value for the same test at the next age level; and if the score is equal or superior to that score value, mark the test plus at that level also. Continue scoring the test in this way until an age level is reached at which the test item has a score value greater than the score made by the child; mark the test minus at this level and at all the succeeding levels at which it occurs.

3. When each test, up to the point where the definite range of successes is established, has been evaluated, the test sheet is ready for the process of finding the total score.

4. Give one point credit for each test passed.

5. To correct for omissions and refusals: To the test

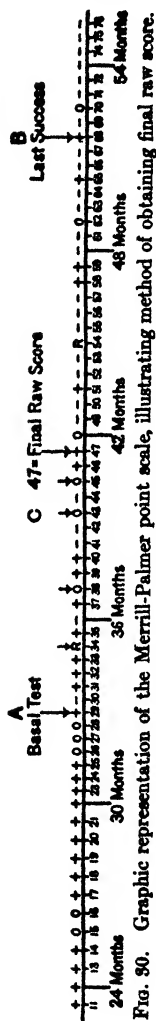
<sup>1</sup> The division of items into age groups is merely for the convenience of the examiner in administering; such a grouping has no significance as far as estimating the child's performance is concerned, since this is a point scale and not an age scale.

number of the *basal test* — i.e., the plus test just preceding the first failure — add 1 for each succeeding plus test. To the score thus obtained add 1 for each omitted or refused test, beginning with the first omitted or refused test after the basal test and continuing until the test number of the omitted or refused tests exceeds the score thus far attained. This count is the final corrected score.

See the sample scored test on pages 228–231 for an example of the method of scoring. The number of the basal test in the sample scored test blank is 29 (Nest of Cubes, 30'' or less). To the number 29 add 1 for each plus test from there on. This total plus count is 43. Keeping this count in mind, return to the basal test, No. 29, and add 1 to the total plus count, 43, for each refused or omitted test after the basal test until the number of the refused or omitted test is greater than the total count. Thus, Test No. 34 is counted, making the total count 44; No. 38 is counted, making the total count 45; No. 43 is counted, making the total count 46; and No. 45 is counted, making the total count 47. The next omitted test is No. 48, which number is greater than the total count number, 47; consequently the test is not added to the count. The corrected final score is thus 47.

A diagram may further elucidate the method used in correcting for refusals and omissions and the process of obtaining the final corrected score. In Figure 30 we have drawn a line divided into evenly-spaced intervals, each representing six months. On this line is indicated the number of test items appearing in each six-month interval. Above the line is represented the achievement of the child Mary Jane Doe, as shown on the sample scored sheet. The score attained on each test item is indicated above the line, over the number of the test item.

The process of obtaining the final corrected score is as follows:



1. Let A to B represent the region of doubtful successes, which covers the range between the first failure and the last success.
2. Begin with Test No. 29, which is the basal test, and add all succeeding plus scores to it. The sum equals 43, which we locate at C, and is the total score uncorrected for omissions and refusals.
3. Test No. 34 is marked *R*. It is less than 43. Theoretically, if the child had attempted to do this test, she would have been more likely to succeed than to fail in it. In order to avoid discounting the score by personality deviations, we should not penalize the child for this refusal. Accordingly, crediting the child 1 point for this refusal brings the total count to 44.
4. Test No. 38 is marked *O*, for omitted. This test likewise lies below the level of successes obtained by Mary Jane, as indicated by the total count 44. The child should not be scored as failing an omitted test in which she was more likely to succeed than to fail. Accordingly, this item is credited, bringing the total count to 45.
5. Test No. 43 was also omitted. But the level of success attained by the child as indicated by the score corrected up to this point is 45, which is more than 43. Test No. 43 should therefore be credited. This brings the total count up to 46.

6. For the same reason we must give the child credit for Test 45, which was also omitted. This brings the total count up to 47.
7. Test No. 48 was also omitted. However, this test is beyond the total count 47, which indicates the level of success that the child would have attained, in all probability, had she taken all the tests. Accordingly, this test and all succeeding omitted and refused tests are scored as if they were failures. The final corrected score is thus 47.

#### INTERPRETING THE SCORE

The final corrected score may be interpreted in one of three ways; i.e., (1) by finding the mental age corresponding to the score in Table 26, or (2) by finding the standard-deviation value of this score in Table 27, 28, or 29, or (3) by finding the percentile value of this score in Table 30. The following sections describe in further detail these three methods of interpreting the final corrected score.

#### *Interpretation by Mental Age*

The mental age corresponding to the final corrected score attained is to be found in Table 26, "Mental-Age Norms for the Merrill-Palmer Test Scale." The scores of the table represent the median score for each month of chronological age. We can say, accordingly, that the score to be evaluated is equal to that of the median child of the age corresponding to this score in the mental-age table. Thus a score of 10 is representative of the median performance of children of 22 months of age, and a child attaining this score is said to have a mental age of 22 months.

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## MERRILL-PALMER SCALE OF MENTAL TESTS

Name Mary Jane Doe Age 36 mos Date \_\_\_\_\_ Examiner \_\_\_\_\_  
 Source \_\_\_\_\_ Date of Birth \_\_\_\_\_ Series No. \_\_\_\_\_  
 Score 47 Mental Age 39 months Sigma Value 1.5 Percentile rank 75

Scoring Symbols: + = success O = omitted

Tests (ranked in order of difficulty)

- = failure R = refused

### 18 TO 23 MONTHS

Scores

- [ ] \*1. Commands (3 of 3) Ball \_\_\_\_\_ Box \_\_\_\_\_
- [ ] \*2. Throwing ball (1 of 3)
- [ ] \*3. Straight tower. Height \_\_\_\_\_
- [ ] 4. Questions (1 of 10)
- [ ] 5. Wallin pag board A (38" or less-best trial)
- [ ] \*6. Walking block
- [ ] \*7. Crossing feet
- [ ] 8. Sixteen cubes (13 or more in box)
- [ ] 9. Repetition of words (2 of 4)
- [ ] \*10. Standing on one foot
- [ ] \*11. Folding paper

Repetition of words:

Kitten \_\_\_\_\_ Ball \_\_\_\_\_  
 Birds \_\_\_\_\_ Dinner \_\_\_\_\_

Repetition of word groups: /4

- + Nice doggie \_\_\_\_\_
- + My little baby \_\_\_\_\_
- + See the pretty dolls \_\_\_\_\_
- + Give me the big box \_\_\_\_\_

Questions:

- + 1. What does a doggie say? bad meow
- + 2. What does a kitten say? meow
- + 3. What does an automobile say? beep
- + 4. What is your name? Mary
- + 5. What is this? (pencil) +
- + 6. What is it for? writing
- + 7. What is this? (chair) +
- + 8. What is it for? playing games
- + 9. What is this? (shoes) +
- + 10. What is it for? my feet

### 24 TO 29 MONTHS

- [ + ] \*12. Repetition of words (4 of 4)
- [ + ] \*13. Identification of self in mirror
- [ + ] 14. Sixteen cubes (128" or less—16 in box)
- [ O ] 15. Wallin pag board A (38" or less-best trial)
- [ O ] 16. Wallin pag board B (41" or less-best trial)
- [ + ] \*17. Drawing up string (1 of 3 trials)
- [ + ] 18. Nest of cubes (280" or less)
- [ + ] \*19. Questions (6 of 10)
- [ + ] \*20. Cutting with scissors
- [ + ] 21. Repetition of word groups (10 of 14 words)

Sixteen Cubes

No. in box 16 Time 62"

*Example.* Taking the final corrected score of the sample scored test, 47, we can find in Table 26 the mental age which corresponds to this score. In the column headed "Score" locate 47; reading across in that row into the

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30 TO 35 MONTHS		Next of Cubes	
( + ) *22. One button (any complete success)		Arrangement	OK Time 18"
( + ) *23. Matching colors R±R±G±Y±		Action Agent 12	
( + )   24. Seguin form board (3 of 3 trials completed)	WHAT RUNS?	WHAT CRIES?	
( + ) *25. Sixteen cubes (100" or less—16 in box)	+ 1. Sings <u>birdie</u>		
( O )   26. Wallin pag board B (37" or less—best trial)	+ 2. Brushes <u>kitty</u>		
( O )   27. Three-cube pyramid (17" or less)	+ 3. Files <u>birdie</u>		
( O )   28. Wallin pag board A (30" or less—best trial)	+ 4. Bites <u>dog</u>		
( + ) *29. Nest of cubes (30" or less)	+ 5. Swims <u>fish</u>		
( - )   30. Two buttons (170" or less)	+ 6. Burns <u>paper</u>		
( + )   31. Seguin form board (323" or less—best trial)	+ 7. Cuts <u>scissors</u>		
( + ) *32. Repetition of word groups (13 of 14 words)	+ 8. Blows <u>tears</u>		
( + )   33. Action agent (6 of 20)	+ 9. Shoots <u>gun</u>		
( R ) *34. Closing fist and moving thumb	- 10. Mils <u>milk</u>		
( + ) *35. Counting two blocks	+ 11. Bails <u>beats</u>		
	+ 12. Boils <u>eggs</u>		
	- 13. Floats <u>water</u>		
	+ 14. Growls <u>dogs</u>		
	- 15. Stings <u>elephants</u>		
	- 16. Gallops <u>don't know</u>		
36 TO 41 MONTHS			
( - )   36. Seguin form board (100" or less—best trial)	- 17. Aches <u>don't know</u>		
( + ) *37. Copying circle (3 of 3)	- 18. Explodes <u>don't know</u>		
( O ) *38. Wallin pag board A (17" or less—best trial)	- 19. Roars <u>beats</u>		
( + )   39. Picture puzzle No. 1 (14" or less)	- 20. Mews <u>victrolas</u>		
( + )   40. Little pink tower (33" or less)	Wallin Pag Boards		
( - )   41. Seguin form board (26 errors or less—total)	A. 1. ....	B. 1. ....	
( - )   42. Two buttons (80" or less)	2. ....	2. ....	
( O )   43. Three-cube pyramid (11" or less)	3. <u>omitted</u>	3. <u>omitted</u>	
( - )   44. Mare and foal (317" or less)	Buttons:		
( O ) *45. Wallin pag board B (33" or less—best trial)	1. <u>69"</u>		
( + )   46. Action agent (10 of 30)	2. <u>181"</u>		
( + )   47. Picture puzzle No. 1 (9" or less)	3. <u>failed</u>		

(Continued on next page)

column headed "Mental Age in Months," we find the number 39. The final corrected score, 47, has, then, a mental-age value of 39 months.

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### 48 TO 67 MONTHS

- [ O ] 48. Three-cube pyramid (9" or less)  
 [ — ] 49. Seguin form board (72" or less—best trial)  
 [ — ] 50. Seguin form board (9 errors or less—total)  
 [ + ] 51. Little pink tower (22" or less)  
 [ — ] 52. Two buttons (34" or less)  
 [ — ] 53. Decroly matching game (3 or more right)  
 [ R ] 54. Opposition of thumb and fingers (3 of 3 trials)  
 [ — ] 55. Four buttons (76" or less)  
 [ — ] 56. Copying cross (3 of 3)  
 [ — ] 57. Mare and foal (308" or less)  
 [ + ] 58. Action agent (12 of 20)  
 [ + ] 59. Picture puzzle No. 1 (4" or less)

### Seguin Form Board

1.	{ Time <u>2:10"</u>	
	{ Errors <u>24 24 24 24 1</u>	<u>21</u>
2.	{ Time <u>1:21"</u>	
	{ Errors <u>24 24 24 11</u>	<u>17</u>
3.	{ Time <u>1:6.9"</u>	
	{ Errors <u>24 24</u>	<u>10</u>
		<u>48</u>

### Mare and Foal

Time	<u>32.5"</u>
Errors	<u>24 24 24 24 24 24</u>

### Little Pink Tower

Time	<u>1:6</u>
Arrangement	<u>OK</u>

### Picture Puzzles

1.	Time <u>2</u>
2.	Time <u>failed</u>
3.	Time <u>failed</u>

### Pyramids

3 cube—time	<u>omitted</u>
6 cube—time	<u>omitted</u>

### 68 TO 83 MONTHS

- [ — ] 60. Seguin form board (63" or less—best trial)  
 [ — ] 61. Manikin (1 point)  
 [ O ] 62. Three-cube pyramid (7" or less)  
 [ — ] 63. Two buttons (30" or less)  
 [ — ] 64. Action agent (18 of 20)  
 [ + ] 65. Picture puzzle No. 1 (3" or less)  
 [ — ] 66. Picture puzzle No. 2 (46" or less)  
 [ — ] 67. Mare and foal (180" or less)  
 [ + ] 68. Little pink tower (17" or less)  
 [ — ] 69. Four buttons (51" or less)  
 [ O ] 70. Six-cube pyramid (35" or less)  
 [ — ] 71. Picture puzzle No. 3 (complete success)  
 [ — ] 72. Decroly matching game (4 or more right)

### *Interpretation by Standard Deviation*

Standard deviation in terms of score values. A second method of interpreting the final corrected score is to find its standard-deviation value in terms of the score. The stand-

# Computation of Total Score and Use of Norms 231

84 TO 89 MONTHS		Mankin
(   73. Mankin (3 points or more)		Points <u>0</u>
(   74. Little pink tower (14" or less)		Deerly Matching Game
(   75. Two buttons (23" or less)		Time <u>failed to get the idea</u>
(   76. Picture puzzle No. 3 (23" or less)		Correct <u>0</u>
(   77. Seguin form board (48" or less)		
(   78. Mare and foal (98" or less)		
(   79. Deerly matching game (217" or less—13 or more right)		
(   80. Six-cube pyramid (20" or less)		
(   81. Action agent (14 of 20)		
(   82. Copying star (1 of 3 trials)		
(   83. Four buttons (42" or less)		
60 TO 65 MONTHS		
(   84. Two buttons (19" or less)		
(   85. Action agent (16 of 20)		
(   86. Seguin form board (30" or less—best trial)		
(   87. Copying star (3 of 3)		
(   88. Deerly matching game (160" or less—13 or more right)		
(   89. Little pink tower (10" or less)		
(   90. Mare and foal (80" or less)		
66 TO 71 MONTHS		
(   91. Deerly matching game (123" or less—13 or more right)		
(   92. Mankin (3 points or more)		
(   93. Seguin form board (35" or less—best trial)		

ard-deviation method of evaluating scores is an excellent device for determining how far a child's performance is above or below the average of that of children of the same age. When the standard-deviation value of the child's score is determined, it may be compared with those of other chil-



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dren, irrespective of age differences. The standard-deviation value of the final score may be determined from Table 27, which gives the standard deviation in terms of score for each chronological age from 18 to 63 months.

The method by which the figures in Table 27 were obtained is described in Chapter X. The procedure is as follows: In Table 27 locate the chronological age of the child in the column headed "Chronological Age in Months." Read across the page at this point until the position of the final corrected score is located in one of the other columns. At the head of this column will be found the standard-deviation value of the score attained by the child. If the score is found to lie between two columns, the standard-deviation position of the score is read as in the one of the two columns which is nearer to  $0\sigma$ . A classification of the standard-deviation values is placed at the head of the several columns to aid in interpreting the score. This classification is as follows:

STANDARD DEVIATION	CLASSIFICATION
- $2.0\sigma$ or lower	Very inferior
- $1.9\sigma$ to - $1.0\sigma$	Inferior
- $0.9\sigma$ to + $0.9\sigma$	Average
+ $1.0\sigma$ to + $1.9\sigma$	Superior
+ $2.0\sigma$ or higher	Very superior

*Example.* In the sample scored test the final corrected score is 47. In Table 27 locate the child's chronological age, 36 months, in the column headed "Chronological Age in Months." Read across the page at this point until the position of the score, 47, is located. It is found to lie between 46 and 51, but the value,  $0.5\sigma$ , of the column in which 46 falls is nearer  $0\sigma$  than is the value,  $1.0\sigma$ , of that in which 51 is located. The final score, 47, therefore, has a value of approximately +  $0.5\sigma$ , or, as compared with the performance of other children of the same age, the score is average.

**Standard deviation in terms of mental-age values.** The standard deviation of the child's mental age can be ascertained by reference to the derived Table 28, "Standard Deviation in Terms of Mental-Age Values." Table 28 was derived by finding the equivalent mental age of each score given in Table 27. The procedure to be followed in determining the standard deviation of the child's mental age is illustrated in the following example.

*Example.* In the sample scored test the child's chronological age is 36 months and her mental age 39 months. In Table 28 locate the chronological age of the child in the column headed "Chronological Age in Months." Read across the page at this point until the position of the child's mental age, 39, is located. It is found to lie between 38 and 41, but the value of the column in which 38 lies is nearer  $0\sigma$  than is the value of the column in which 41 lies. Accordingly the score has the standard-deviation value of  $+0.5\sigma$  and falls within the range of average scores.

**Standard deviation in terms of intelligence quotient.** The standard deviation of the child's intelligence quotient, as obtained by dividing the mental age by the chronological age, can be determined by reference to the derived Table 29, "Standard Deviation in Terms of Intelligence Quotient." This table was derived from Table 28 by determining the intelligence quotient represented by each mental age given, in terms of the chronological age given in the first column. For example, mental ages from 18 to 24 months occur at the chronological age of 18 months (see the first horizontal row of Table 28). To secure the intelligence quotient represented, each of these mental ages is divided by 18 (the chronological age), the answer is carried to two decimal places, and then the decimal point is dropped. The figures thus obtained are found in the first horizontal row of Table 29. Thus, when the child's intelligence quotient has

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been determined, it is possible to interpret it in terms of the varying intelligence quotients found among children of the same chronological age.

*Example.* In the sample scored test the child's IQ is 108. In Table 29 locate the chronological age, 36 months, in the column headed "Chronological Age in Months." Read across the page at this point until the position of the child's intelligence quotient, 108, is located. It is found to lie between 106 and 114, but is read as 106 since the standard-deviation value of this score is nearer  $0\sigma$  than is that of 114; the IQ of 108 accordingly has a standard-deviation value of  $+0.5\sigma$ , or as compared with those of other children of the same chronological age the IQ is average.

### *Interpretation by Percentile Rank*

The percentile rank of the score attained at a given age furnishes another measure of variability often useful in interpreting the score.

Smoothed percentile curves of scores for the various chronological age groups are given in Chapter X. To facilitate the use of these curves in interpreting scores, Table 30, "Percentile Ranks in Terms of Score Values," with interpolated values for the chronological ages from 21 to 63 months inclusive, has been prepared. A classification of the percentile ranks is placed at the head of the several columns to aid in interpreting the score. This classification is as follows:

PERCENTILE RANK	CLASSIFICATION
1 to 4	Very inferior
5 to 19	Inferior
20 to 79	Average
80 to 94	Superior
95 to 99	Very superior

*Example.* The procedure to be followed in determining the percentile rank of the score is illustrated in the following example. In the sample scored test the chronological age of the child is 36 months and the score attained 47. In Table 30 locate the chronological age in the column headed "Chronological Age in Months." Read across the page at this point until the figure representing the child's score, 47, or the figure with which it most nearly coincides, is located. It is found to lie midway between 45 and 49, which have percentile ranks of 70 and 80 respectively. Accordingly, the score can be given an interpolated percentile rank midway between these points, or 75, and falls within the range of average scores.

#### RECOMMENDED METHODS OF INTERPRETING THE SCORE

For purposes of comparing the performance of children of different ages, or the performance of the same child at different ages, interpretation of the score by standard deviation in terms of score value or mental-age value and interpretation by percentile rank are preferable to interpretation in terms of the intelligence quotient.

An inspection of Table 29, "Standard Deviation in Terms of Intelligence Quotient," will readily indicate the difficulty. An IQ of 119 may have a range of values at different age levels from  $+0.5\sigma$  to  $+2.0\sigma$ . In other words, a child of 27 months of age who has an IQ of 119 has attained the same level of superiority as a child of 48 months of age who has an IQ of 154. Interpretation of the score in terms of the intelligence quotient assumes that the variability in terms of mental age increases at an evenly progressive rate with zero as an origin. Although this should possibly be true with an ideal scale, it is not true of the present Merrill-Palmer scale.

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TABLE 26

MENTAL-AGE NORMS FOR THE MERRILL-PALMER TEST SCALE

SCORE	MENTAL AGE IN MONTHS	SCORE	MENTAL AGE IN MONTHS
0	18 or less	47	39
1	18 or less	48	39
2	18 or less	49	40
3	18	50	40
4	19	51	41
5	19	52	42
6	20	53	42
7	20	54	43
8	21	55	44
9	22	56	44
10	22	57	45
11	23	58	46
12	23	59	46
13	24	60	47
14	25	61	47
15	25	62	48
16	26	63	49
17	26	64	49
18	27	65	50
19	27	66	50
20	28	67	51
21	28	68	52
22	29	69	53
23	29	70	54
24	30	71	55
25	30	72	55
26	31	73	56
27	31	74	57
28	31	75	58
29	32	76	59
30	32	77	60
31	32	78	61
32	33	79	62
33	33	80	63
34	34	81	66
35	34	82	69
36	34	83	70
37	35	84	71
38	35	85	73
39	36	86	74
40	36	87	75
41	37	88	76
42	37	89	77
43	37	90	78
44	38	91	78 or more
45	38	92	78 or more
46	38	93	78 or more

TABLE 27  
STANDARD DEVIATION IN TERMS OF SCORE VALUES

CHRONO- LOGICAL AGE IN MONTHS	VERY INFERIOR		INFERIOR		AVERAGE			SUPERIOR		VERY SUPERIOR	
	-2.5 $\sigma$	-2.0 $\sigma$	-1.5 $\sigma$	-1.0 $\sigma$	-0.5 $\sigma$	0.0 $\sigma$	0.5 $\sigma$	1.0 $\sigma$	1.5 $\sigma$	2.0 $\sigma$	2.5 $\sigma$
18	0	0	0	0	1	3	5	7	9	11	13
19	0	0	0	0	2	4	6	8	10	12	14
20	0	0	0	2	4	6	8	10	12	14	16
21	0	0	2	4	6	8	10	12	14	16	18
22	0	1	3	5	8	10	12	14	16	18	20
23	0	1	4	6	9	11	14	16	19	21	24
24	1	3	6	8	11	13	16	18	21	23	26
25	1	4	7	9	12	15	18	20	23	25	28
26	1	4	7	10	13	16	19	22	25	28	31
27	1	4	8	12	15	18	21	24	27	30	33
28	3	6	10	13	17	20	24	27	31	34	38
29	3	7	11	15	19	23	27	31	35	39	43
30	3	7	12	16	21	25	30	34	39	43	48
31	3	8	13	18	23	28	33	37	43	47	53
32	5	10	15	20	25	30	35	40	45	50	55
33	8	13	18	23	28	33	38	43	48	53	58
34	10	15	20	25	30	35	40	45	50	55	60
35	11	18	23	28	33	38	43	48	53	58	63
36	12	18	23	29	34	40	46	51	57	62	68
37	14	20	25	31	36	42	48	53	59	64	70
38	16	22	27	33	38	44	50	55	61	66	72
39	19	25	30	36	41	47	53	58	64	69	75
40	20	26	32	37	43	49	55	60	66	71	77
41	20	26	32	38	44	50	56	62	68	74	80
42	22	28	34	40	46	52	58	64	70	76	82
43	23	29	35	41	47	53	59	65	71	77	83
44	25	31	37	43	49	55	61	67	73	79	85
45	27	33	39	45	51	57	63	69	75	81	87
46	28	34	40	46	52	58	64	70	76	82	88
47	30	36	42	48	54	60	66	72	78	84	90
48	32	38	44	50	56	62	68	74	80	86	92
49	33	39	45	51	57	63	69	75	81	87	93
50	34	40	46	52	58	64	70	76	82	88	93
51	35	41	47	53	59	65	71	77	83	89	93
52	37	43	49	55	61	67	73	79	85	91	93
53	39	45	51	57	63	69	75	81	87	93	93
54	40	46	52	58	64	70	76	82	88	93	93
55	41	47	53	59	65	71	77	83	89	93	93
56	42	48	54	60	66	72	78	85	91	93	93
57	42	48	54	61	67	74	81	87	93	93	93
58	43	49	55	62	68	75	82	88	93	93	93
59	44	50	56	63	69	76	83	89	93	93	93
60	45	51	57	64	70	77	84	90	93	93	93
61	46	52	58	65	71	78	85	91	93	93	93
62	47	53	59	66	72	79	86	92	93	93	93
63	48	54	60	67	73	80	87	93	93	93	93

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TABLE 28

STANDARD DEVIATION IN TERMS OF MENTAL-AGE VALUES<sup>1</sup>

CHRONOLOGICAL AGE IN MONTHS	VERY INFERIOR		INFERIOR		AVERAGE			SUPERIOR		VERY SUPERIOR	
	-2.5 $\sigma$	-2.0 $\sigma$	-1.5 $\sigma$	-1.0 $\sigma$	-0.5 $\sigma$	0.0 $\sigma$	0.5 $\sigma$	1.0 $\sigma$	1.5 $\sigma$	2.0 $\sigma$	2.5 $\sigma$
18	..	..	..	..	..	18	19	20	22	23	24
19	..	..	..	..	..	19	20	21	22	23	25
20	..	..	..	..	19	20	21	22	23	25	26
21	..	..	..	19	20	21	22	23	25	26	27
22	..	..	18	19	21	22	23	25	26	27	28
23	..	..	19	20	22	23	25	26	27	28	30
24	..	18	20	21	23	24	26	27	28	29	31
25	..	19	20	22	23	25	27	28	29	30	31
26	..	19	20	22	24	26	27	29	30	31	32
27	..	19	21	23	25	27	28	30	31	32	33
28	18	20	22	24	26	28	30	31	32	34	35
29	18	20	23	25	27	29	31	32	34	36	37
30	18	20	23	26	28	30	32	34	36	37	39
31	18	21	24	27	29	31	33	35	37	39	43
32	19	22	25	28	30	32	34	36	38	41	44
33	21	25	27	29	31	33	35	37	39	43	46
34	22	27	28	30	32	34	36	38	41	44	47
35	23	27	29	31	33	35	37	39	43	46	49
36	23	28	29	32	34	36	38	41	45	48	52
37	25	29	30	32	34	37	39	43	46	50	54
38	26	30	31	33	35	38	41	44	47	51	56
39	27	31	32	34	36	39	43	46	50	53	58
40	28	31	33	35	37	40	44	47	51	55	60
41	28	31	33	35	38	41	44	48	52	57	63
42	29	32	34	36	38	42	46	50	54	59	69
43	29	32	34	37	39	43	46	51	55	60	70
44	30	33	35	37	40	44	47	52	56	62	73
45	31	34	36	38	41	45	49	53	58	66	75
46	31	34	36	38	42	46	50	54	59	69	76
47	32	35	37	39	43	47	51	56	61	71	78
48	33	35	38	41	44	48	52	57	63	74	..
49	33	36	38	41	45	49	53	58	66	75	..
50	34	36	38	42	46	50	54	59	69	76	..
51	34	37	39	43	46	51	55	60	70	77	..
52	35	37	40	44	47	52	56	62	73	78	..
53	36	38	41	45	49	53	58	66	75	..	..
54	36	38	42	46	50	54	59	69	76	..	..
55	37	39	43	46	51	55	60	70	77	..	..
56	37	39	43	47	51	56	61	73	78	..	..
57	37	39	43	47	52	57	66	75	..	..	..
58	37	40	44	48	52	58	69	76	..	..	..
59	37	41	44	49	53	59	70	77	..	..	..
60	38	41	45	50	54	60	71	78	..	..	..
61	38	42	46	51	55	61	73	78	..	..	..
62	39	43	46	51	56	62	74	78	..	..	..
63	39	43	47	52	56	63	75	78	..	..	..

<sup>1</sup> The mental ages are in months.

TABLE 29

STANDARD DEVIATION IN TERMS OF INTELLIGENCE QUOTIENTS

CHRONO- LOGICAL AGE IN MONTHS	VERY INFERIOR		INFERIOR		AVERAGE			SUPERIOR		VERY SUPERIOR	
	-2.5 $\sigma$	-2.0 $\sigma$	-1.5 $\sigma$	-1.0 $\sigma$	-0.5 $\sigma$	0.0 $\sigma$	0.5 $\sigma$	1.0 $\sigma$	1.5 $\sigma$	2.0 $\sigma$	2.5 $\sigma$
18	..	..	..	..	..	100	105	116	122	128	133
19	..	..	..	..	..	100	105	110	116	121	126
20	..	..	..	..	95	100	105	110	115	125	130
21	..	..	..	91	95	100	105	109	119	124	129
22	..	..	82	86	95	100	105	114	118	123	127
23	..	..	83	87	96	100	108	113	117	122	130
24	..	75	83	88	96	100	108	112	117	121	129
25	..	76	80	88	92	100	108	112	116	120	124
26	..	73	77	85	92	100	104	112	116	119	123
27	..	70	78	89	93	100	104	111	115	119	122
28	64	71	79	86	93	100	107	111	114	121	125
29	62	69	79	86	93	100	107	110	117	124	128
30	60	66	77	87	93	100	107	113	120	123	130
31	58	68	77	87	93	100	106	113	119	126	139
32	59	67	78	88	94	100	106	113	119	128	138
33	64	76	82	88	94	100	106	112	118	130	139
34	65	79	82	88	94	100	106	112	121	129	138
35	66	77	83	89	94	100	106	111	123	131	140
36	64	77	81	89	94	100	106	114	125	133	144
37	68	78	81	88	92	100	105	118	124	135	146
38	68	76	81	87	92	100	108	116	124	134	147
39	69	79	82	87	92	100	110	118	128	136	146
40	70	78	83	88	93	100	110	118	128	138	150
41	68	78	80	88	93	100	107	117	127	139	153
42	69	76	81	87	90	100	109	119	128	140	165
43	68	74	79	86	91	100	107	118	128	139	162
44	68	75	79	84	91	100	107	118	127	141	165
45	69	75	80	84	91	100	109	118	129	146	166
46	67	74	78	83	91	100	109	117	128	149	165
47	68	74	76	83	91	100	108	119	127	150	165
48	69	73	79	85	91	100	108	118	131	154	...
49	67	73	77	84	92	100	108	118	134	153	...
50	68	72	76	84	92	100	108	118	138	152	...
51	66	73	76	84	90	100	108	117	137	150	...
52	68	71	77	84	90	100	108	119	140	150	...
53	68	72	77	85	92	100	109	124	141	...	...
54	67	70	78	85	92	100	109	127	140	...	...
55	67	72	78	83	90	100	109	127	140	...	...
56	66	70	77	84	91	100	109	130	139	...	...
57	65	68	75	82	91	100	115	131	...	...	...
58	63	69	76	83	90	100	118	130	...	...	...
59	63	69	75	83	90	100	118	130	...	...	...
60	63	68	75	83	90	100	118	130	...	...	...
61	62	69	75	83	90	100	119	128	...	...	...
62	63	69	74	82	90	100	119	125	...	...	...
63	62	66	75	82	89	100	119	124	...	...	...



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TABLE 30

PERCENTILE RANKS IN TERMS OF SCORE VALUES

CHRONOLOGICAL AGE IN MONTHS	VERY INFERIOR 1-4	INFERIOR 5-19		AVERAGE 20-79						SUPERIOR 80-94		VERY SUPERIOR 95-99	
	1	5	10	20	30	40	50	60	70	80	90	95	99
21 <sup>1</sup>	0	2	3	5	6	7	8	9	11	12	15	17	22
22	1	3	4	6	8	9	10	11	13	14	17	19	23
23	2	4	6	7	9	10	11	12	14	16	19	21	24
24	2	5	7	8	11	12	13	14	16	18	21	23	26
25	2	5	8	9	13	14	15	16	18	20	23	25	28
26	2	6	9	11	14	15	16	17	19	21	25	27	30
27	2	7	10	13	15	16	18	19	21	23	27	29	33
28	3	8	11	14	17	18	20	21	23	26	30	33	37
29	4	9	12	15	18	20	23	24	26	29	33	37	41
30	6	10	13	17	20	23	25	26	28	32	36	40	45
31	6	11	14	19	22	25	28	29	31	35	39	43	48
32	7	12	15	20	24	27	30	31	34	38	43	47	52
33	8	13	16	22	26	29	33	34	37	41	46	50	56
34	10	15	18	24	28	31	35	36	39	43	48	52	58
35	12	17	21	27	31	34	38	39	42	46	51	55	61
36	15	20	24	30	34	37	40	42	45	49	54	58	64
37	17	22	27	32	36	39	42	45	48	51	56	60	66
38	19	25	30	35	39	42	44	48	51	54	59	62	68
39	22	28	33	38	42	45	47	51	54	57	62	65	70
40	24	29	34	39	43	47	49	53	56	58	63	66	71
41	26	30	35	40	44	48	50	54	57	60	65	68	73
42	28	32	36	42	46	50	52	56	58	62	67	70	75
43	28	33	37	43	47	51	53	57	59	63	68	71	76
44	28	34	38	44	48	52	55	58	61	64	69	73	78
45	29	35	39	46	50	54	57	60	63	66	71	75	80
46	30	37	40	47	51	55	58	61	64	67	72	76	81
47	32	38	42	48	53	56	60	62	65	68	73	77	82
48	34	40	44	50	55	58	62	64	67	70	75	78	83
49	35	42	46	51	56	59	63	65	68	71	76	79	84
50	37	44	47	53	57	60	64	66	69	72	77	80	85
51	39	46	49	55	59	62	65	68	71	74	78	81	87
52	41	47	51	56	60	63	67	69	73	75	79	82	88
53	43	49	53	58	62	65	69	71	74	77	80	84	90
54	45	51	55	60	64	67	70	73	75	78	82	85	92
55	46	52	56	61	65	68	71	74	76	79	83	86	92
56	47	53	58	63	66	70	72	75	78	81	85	87	93
57	49	55	60	65	68	72	74	77	80	83	87	89	93
58	50	56	61	66	69	73	75	78	81	84	88	90	93
59	51	57	62	67	71	75	76	79	82	85	88	90	93
60	53	58	63	68	73	76	77	80	83	86	89	91	93
61	54	59	64	69	74	77	78	81	84	86	90	91	93
62	55	60	65	71	75	78	79	82	85	87	90	92	93
63	57	61	67	73	77	79	80	83	85	88	91	93	93

<sup>1</sup> Percentile values could not be obtained for age groups under 21 months.

## CHAPTER FOURTEEN

### GUIDE FOR PERSONALITY OBSERVATIONS

IN the administration of mental tests, as in other scientific procedures, the ideal is to control, or keep constant, all variables except the one to be studied — in this case the intelligence of the individual tested. Given these conditions, it would seem very simple to study the effectiveness of the individual's response to the test situation. But there is difficulty when we attempt to evaluate this response, for back of every individual response is a group of variables which we have not been able to control and of whose relative strength we are totally uncertain. Self-reliance, initiative, self-consciousness, and persistence are such variables. At present it is impossible for us to isolate the effects produced by these non-intellectual traits from those produced by the intellectual abilities. Even in the most rigidly controlled test situation we are, of course, testing the ability of the individual to do a certain piece of work, and though the results may be called a measure of the individual's intelligence they can certainly be analyzed into causative elements, many of which are not ordinarily implied in that concept.

At present we make a valiant attempt to control as many of the outside variables as possible. We put the child to be tested through the little tasks designed to bring out certain types of responses, ignoring all the responses but those which most obviously bear on the results we desire, although we realize that every movement a child makes in a test situation is conceivably significant if only we had the key. We have so planned the situations in the Merrill-Palmer tests that they tend to bring out the responses that most nearly indicate individual differences in what we choose to call mental development. Each task presented is so designed that the response will be dominated by the amount and

quality of the mental ability possessed by the child. Nevertheless, factors of personality and character enter in to disturb the results to such an extent that we are frequently at a loss to know how to interpret them.

Given a controlled environment and a uniform method of test administration, it is possible to study the variables of personality. However, as already stated, the present Merrill-Palmer test scale is planned chiefly to indicate differences in mental development and to minimize the effect of personality differences, so the latter can only be estimated; nor are we justified in evaluating these estimates with the same degree of confidence with which we evaluate mental development. But observations made during considerable use of the scale do permit us to state some of the problems and difficulties involved in testing personality tendencies.

The first problem in personality testing is that no convenient scale concept, such as mental age, has been proposed to measure development or quantity in the various traits. We are not sure that we are justified in assuming that such personality traits as self-confidence, neatness, persistence, and unselfishness have developmental age values, as does intelligence. It seems safer at present to think only in terms of a crude scale with steps to which arbitrary values, in terms of degree of presence or absence, are assigned. Any scale must have more or less subjective values assigned to its separate steps in order that it be a scale. We are frequently in danger of forgetting this fact in our manipulation of scales of intelligence. The more highly refined and remote the subjective elements are, the more objective and accurate the test may seem. The remoteness of the subjective elements is likely to delude us into thinking that the test is not subjective at all.

As with mental-test scales, one difficulty with the formula-

tion of personality-test scales is the setting up of steps that are approximately equal.

Another difficulty is the formulation of steps of development that are readily recognizable under given test situations. It is possible to formulate such steps by the method of standardization. Each step, with as many as possible of its variant forms of response, should be described in detail, much as Terman has set forth the range of possible responses for the various tests in the Stanford Binet series.

The problem, then, of getting at a more satisfactory evaluation of personality involves the isolation of significant steps and the discovery of test situations that will bring these out. The Merrill-Palmer scale has possibilities for aiding in this problem. The scale places a child in an experimental situation in which we can compare his responses to those of many other children in the same situation. The sum total of the child's reaction is significant. It is an entity. We have separated the mental-growth elements of this reaction as far as we can and have organized them into a scale. But it is not enough to get the mental-test score when at the same time we might have a much more valuable measure of that entity, the responding child.

While the test scale was being standardized, the realization of its wider values was brought home to the investigator only gradually. Many responses threw light on the child's environmental adjustment and many reactions gave an insight into temperamental make-up, revealing what a mine of possibilities were ignored by one who utilized the test situation to get at differences in mental development alone. Up to the present time no attempt has been made to work out quantitative values for these responses. The responses were simply recorded, and gradually, through frequent checking, more confidence was gained in the validity of such observations as indications of personality tendencies.

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The preschool child in the test situation offers a fascinating field for personality observation. He approaches the test as if it were a game and is relatively free from self-consciousness. He is rarely interested in making an impression, is not affected by the incentive of competition, and usually does not realize that he is being tested. As a consequence his reactions in the test situation give a better sample of his everyday adjustments than do those of older children.

The following list of traits and discussion of ways of observing these traits in the test situations presented in the Merrill-Palmer scale is not meant to be complete or scientifically accurate, but is intended, rather, to suggest the possibilities to others who are to use the scale, in the hope that ultimately more accurate methods of evaluating personality will be evolved.

### SELF-RELIANCE

There are decided differences shown by children in their attitude toward accomplishment. All degrees of self-reliance are met with in the test situation. The quality of self-reliance is shown frequently in the attitude of the child toward all the tests of a puzzle type, or toward any self-corrective test. The examiner should notice the child's reaction toward several test situations before he records the child's reaction type on this trait. The record should be in terms describing his reaction to the test situation, and it may not fit in with any of the classes suggested here. It may not even be consistent throughout the test series. Without further checking, one cannot judge from the test response how accurately the child's tendency toward self-reliance in life situations has been gauged. The degree of self-reliance exhibited by children in such a situation may be rated as follows:

*Extremely self-reliant.* The child grows irritated if assistance is offered, even for tasks that are too difficult for him. He takes great pride in pointing out that he "did it all by himself." He is sure of himself and knows he can do each task that comes along. He is indifferent as to whether or not the examiner approves his methods.

*Moderately self-reliant.* The child prefers to do tasks for himself but does not openly resent assistance. He starts immediately to work on the task presented.

*Average self-reliance.* The child will accept help if it is offered. He usually does not ask for help unless the task is very difficult. He needs little encouragement.

*Slightly lacking in self-reliance.* If the task is at all difficult, the child asks for assistance. He does not think he can do it. He frets, "This is too hard. I don't think I can do it," and keeps saying, "You help me. I can't put this in."

*Very much lacking in self-reliance.* Almost before he tries, the child says he can't do the test. He asks, "Which way does it go?" without looking at the task. He looks at the examiner instead of at the test material. Repeated urging and encouragement are necessary. The child is very much dependent upon the approval of the examiner.

#### POWER OF SELF-CRITICISM

Closely related to the self-reliance shown by the child is the extent to which he makes his own judgments as to methods of solving the problem presented or expects clues from the examiner. Self-criticism is revealed by the degree of insight the child has into his failures, especially on tests that are not self-corrective. Two children may have done equally poorly on a task, but one will be conscious of his failure and comment upon it, while the other will be entirely unaware of his failure. Such tests as the Mani-

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kin, the Decroly Matching Game, Matching Colors, the Pyramids, the Little Pink Tower, and the Nest of Cubes are especially good in bringing out these differences.

*Very self-critical.* Such a child nearly always realizes that he has failed, even in tests that are not self-corrective. He makes accurate comments upon his ability to perform tasks, as follows: "I didn't get that one right"; "That is too hard for me" — when this is a correct statement; or, as the child who was doing the button tests remarked, "I can't do these [four buttons] so quickly as the others. There was only two on the other one." He does not have to ask, "Is that right?" He seems to be able to judge accuracy for himself, as in the case of one child who talked to himself in this way as he worked on the Mare and Foal Test: "Dat go in dere?" and after trying, answered himself, "Nope," and trying in another hole, "Dat go in dere? Yep." In the Manikin Test he detects his errors and corrects them.

*Moderately self-critical.* The child usually realizes when he has failed, and knows when he has done well. He is not so prone to comment upon the quality of his achievement as is a very self-critical child. He does not always know the quality of his success, and asks occasionally, "Is that right?" He tends to make wrong judgments about some element of his performance, as in the case of one child who, after working for 220 seconds on Picture Puzzle No. 2, finally completed the task satisfactorily and exclaimed with delight, "That's a good one. I can do things fast, can't I?"

*Average tendency toward self-criticism.* The child nearly always realizes failure on self-corrective tests, such as Nest of Cubes, Seguin Form Board, Mare and Foal, and the Button tests. He usually does not realize failures on tests that are not self-corrective, such as Decroly Matching Game, Color Matching, Manikin, and the Pyramid tests. He realizes his

failures when they are conspicuously bad, and sometimes prefers not to analyze the quality of his performance.

*Slightly lacking in power of self-criticism.* The child often fails to realize failure even in self-corrective tasks. He often asks: "Is this right?" "Did I do that?" "Is it good?" The child usually tends to be very well satisfied with his performances, calling all of them good. Occasional realization of extremely poor performances or of especially good performances is shown.

*Extremely lacking in power of self-criticism.* The child thinks every failure a success. If asked if the task is done correctly, he replies, "Yes." The following notes describe some instances of the lack of the power of self-criticism:

This little girl failed to get the idea of the test when given Picture Puzzle No. 3, yet she said: "Isn't that a sweet little girl I made? She haven't any mamma. Where's her daddy? Where's her sister?"

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This child placed the pieces of Picture Puzzle No. 2 in a haphazard fashion and stopped with an expression indicating satisfied accomplishment. When questioned, he said that the puzzle was together.

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A child 29 months old placed the buttonholes on top of the buttons, patted the strips a few times, then picked them up and with a look of satisfaction handed them to the examiner. "Are they buttoned?" the examiner asked. "Yes," the child answered.

#### IRRITABILITY TOWARD FAILURE

Children differ greatly in their acceptance of failure. To some, failure is unbearable; and to others, while they recognize it, it seems to be a matter of indifference. In the Merrill-Palmer test scale there is a better opportunity to observe this attitude in children under 4 years of age than in children of the older group. If it is desirable to get an idea of the child's reactions at the fourth-year level, the Triangle



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Test or one of the three Form Boards — the Casuist, Five-Figure, or Two-Figure from the Pintner-Paterson series — is more satisfactory than are any of the tests in the Merrill-Palmer scale. In studying this trait, it is, of course, essential that the child realize that he is failing. He must also be sufficiently interested in the test to start it with pleasure.

A series of observed reactions, descending from extreme irritability to total indifference about failure, is given below :

*Extreme irritability toward failure.* The child is very much upset with lack of success. He grows angry, pounds the test, throws test materials on the floor, and cries.

Two examples of this tendency, taken from test notes, follow :

Ann worked for a short time with the Nest of Cubes and then in desperation at her lack of immediate success swept the whole test off on to the floor.

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This child was having little success with the Seguin Form Board and seemed somewhat irritated. The examiner urged him to continue. Suddenly, without warning, he began throwing the pieces and staged a terrific tantrum which lasted for several minutes.

*Moderate irritability toward failure.* The child is irritated at lack of success but expresses this irritation chiefly in terms of language, giving elaborate excuses for failure, or by quick thwarted movements and extra expenditure of energy on the test materials. The following examples seem to illustrate this type :

This child was exasperated. "If I had these buttons home, I'd put them on my waist or suit or something. I never heard of these kind of buttons, so hard to button. Gee whiz, I can't button these. These darn buttons are too scrapey."

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Kept fretting as he worked on the Seguin Form Board, "I can't do a thing. I can't put them in. You'll have to put this in. I can't do it." Obviously irritated. The longer he worked, the more fretful and discouraged he became. Finally refused to try any longer.

*Average irritability toward failure.* A tendency is shown toward explaining failure by elaborate excuses. The child attempts to conceal failure from examiner by distracting his attention. Some irritation is shown, but it is expressed verbally for the most part. The following examples seem to illustrate this type:

This child tried to conceal his failure on the Mare and Foal Test by talking about the picture. He stopped to cuddle the horse's head. "Oh, what's the matter? Him frowned it up. Him's so sleepy, so tired he doesn't know what to do." After the examiner urged him to return to his task, he tried for a period without great success, and made several comments as he worked, such as, "Oh gosh, that's a bad horse." Not much show of irritation except by language.

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"I don't know how to button things. I'm just a little boy." Made impatient gestures occasionally. Finally handed the button strip to the examiner very much twisted. "I'll button them better when I get a man."

*Very slight irritation toward failure.* The child gives brief excuses for failure; but he is not disturbed by lack of success. If the task is too difficult, he just plays with pieces. No real effort to succeed is made. The following example seems to illustrate this type:

This child failed the four-button strip, not really trying. She gave as an excuse, "I'm not a big girl yet."

*No irritation toward failure.* The child does not offer any excuse. He makes no overt expression of irritation. He accepts failure as natural and obvious. The following examples seem to illustrate this type:

Failure in the Mare and Foal Test. "See the cutey little horse," she said. She put the pieces on top. Explanation useless. She kept on talking. "The baby ones are to go home. This one stays by you. That little game's going to be like me." Then she put the pieces in a row on the table.

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This child talked continuously about the Seguin Form Board pieces but made little effort to put them in. He played with them, made imaginative comments about them, but seemed uninterested in putting the pieces into their holes.

"I can't do it. You take this. Let me see another game." Handed the pieces back without other excuse. Did not seem to care whether or not she failed.

### DEGREE OF PRAISE NEEDED FOR EFFECTIVE WORK

Children differ greatly in the amount of encouragement they require to keep them working happily at a task. They differ also in the amount of approval required for each effort. Only by experience can the examiner learn to judge the child's reactions and know when to tone down the effusiveness of the praise or when to increase it. One child will be spurred into extreme self-consciousness, showing off and acting foolishly, by the same amount of approval that is necessary to keep another from discontinuing his effort because of his discouragement and lack of self-confidence. Variations in the degree of praise needed run as follows:

*Type 1.* A moderate amount of praise is helpful to the child, but great appreciation of performance is not expected or received favorably. Examples of this type of reaction to praise follow:

This child is a good, steady worker. Not many shifts of attention. He appeared somewhat shy at first. A fair amount of praise for his attempts appeared to place him more at ease. Later in the test this was unnecessary.

This child showed herself to be coöperative, interested, and careful. She reacted most favorably to a moderate amount of approval judiciously placed.

*Type 2.* Indifference to approval is characteristic. Quality of performance is not affected by amount of praise administered. Examples of this type of reaction were noted:

Child reacts indifferently to praise. If she wishes to stop working upon a test, no amount of praise or encouragement is effective in keeping her at the task. She displays a sort of deafness to the examiner at such times, seeming to exclude her from the picture.

An alert, energetic child. Works steadily and is interested in the test materials. Needs no commendation. Aware of his success but seems indifferent to remarks of approval from examiner.

A silent worker. Responded just as well to tasks when little praise was given as when praise was effusive.

*Type 3.* Praise of this type of child induces extreme self-consciousness, tending to inhibit response. Examples of this type of response follow:

Child worked much better when no comments were made. In one instance, before the examiner realized this, the child was obviously interested but refused to try further because some comment was made about the test.

This 4-year-old pouted and lagged in response when praised. Did much better when an attitude of entire objectivity toward the test was maintained and when there was no comment upon the quality of the performance.

*Type 4.* Constant praise is expected by the child, but he does better work when praise is not given too readily. This type of child tends to overestimate his performance. Examples of this type of reaction from test notes may be helpful:

The examiner found it profitable to praise this child sparingly. When praised for her performance she said, "You see, I know how to use my head." She talked a great deal, and all her talking tended toward personal evaluation.

This child acted foolishly and tended to show off when praised. The examiner found it necessary to administer approving comments very sparingly.

This child nearly burst with pride when she placed a piece correctly. The examiner had to be careful in administering praise and commendation.

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*Type 5.* Constant praise and encouragement are needed to keep the child at work. The child seems lacking in self-confidence and requires much approval. His efforts lapse into indifferent performance when there is a lag in the appreciative comments from the examiner.

### INITIATIVE AND INDEPENDENCE OF ACTION

The originality, initiative, and independence of action displayed by the child are traits worth observing and are frequently brought out in the test situation. Children differ greatly in their ability to plan a method of attack in solving a test and in the suggestions which the test materials give them. Initiative and independence of action are probably shown in the following reactions:

This child knew just which place she wanted to fill first and declined to start with the block handed to her by the examiner. "First, I am going to finish dis," she said.

"I know how to make a bigger one," the child said, after building a six-cube pyramid. He then took all the blocks, making a larger pyramid.

In the Matching Colors Test this child grasped the idea immediately but rearranged the boxes on the table to suit his own ideas. As soon as he completed a box, he shut it up without being told and put it in the large box.

Lack of initiative and of independence of action are probably indicated by the following types of response:

Throughout the examination this child made no movements not definitely requested by the examiner. He was passive, non-resistant, and repressed.

When presented with Picture Puzzle No. 2, this child stared at it for a long time. The examiner repeated instructions. The child picked up the pieces and held them in the air. "This is a boat," he said. He did not try to make a picture. He sat and looked at the parts, pushing them occasionally.

#### SELF-CONSCIOUSNESS

It is not difficult to note the differences in children in regard to self-consciousness, though this trait affects children in different ways. A self-conscious child may be very shy, he may be inclined to show off and act foolishly, or he may be extremely negative, refusing to coöperate. All these types are clearly and distinctly differentiated from the child who approaches the task objectively and is not accustomed to constant self-reference.

The two following instances give an idea of the type of observations that can be made while giving the Merrill-Palmer test:

Much interest was shown by this child in the accumulation of boxes on the chair. Any device that took the child's attention from herself proved to be helpful. She seemed to resent being watched. She worked better when the examiner wrote. In the Decroly Matching Game she put on the wrong piece when the examiner watched her. She looked to see what response the examiner would make. When the examiner went on writing, pretending not to see it, she changed it for the correct piece.

This child swaggered, showed off, and was very aggressive. Boasted to the examiner, "I could play much better than you could." He tried obviously wrong places in the Seguin Form Board to note the effect. He talked in a loud braggadocio manner. He stuttered, "Where is that dumb-dumb bell?" He talked continually at the test materials, but obviously for the benefit of the examiner. Frequently he would break off and exclaim, "Hey, you watch me. Watch me get it right!"

#### SPONTANEITY AND REPRESSION

While the spontaneity of the child is somewhat related to his mood, yet to a certain extent there is a habitual tendency toward repression or spontaneity and this is exhibited independently of the mood in which the child happens to be. Useful clues to this trait are: (1) the freedom with

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which the child sets to work at his task, (2) the degree to which he is willing to ask for what he wants, (3) the amount and the type of talking the child does, (4) the intensity of his voice in talking.

1. *The freedom with which different children set to work at the tests varies greatly.* Some children are so repressed that they are afraid to touch anything, and only by carefully urging the test upon the child with smiles and commendatory remarks can the examiner overcome this hesitation. The reason for such a reaction in one case was found to be a self-confessed habit of the child's mother: "Oh, Johnny won't touch anything unless I tell him he can. I've smacked his hands ever since he was a baby if he did. You can play with these things, Johnny." Only with much hesitation and urging, in spite of an apparently keen desire to play with the test objects, was Johnny induced to do his share of the examination.

In another instance the Manikin was spread out before the child. He timidly counted the pieces. Upon encouragement he touched each one. The examiner repeated instructions. He seemed afraid to move the pieces. He was persuaded to play with them, and the result was a performance earning two points.

Again, this is a frequent observation: "This child would not wait until all the pieces were placed in their piles. Very eager to be at the task."

2. *The degree to which the child is willing to ask for what he wants is another indication of his spontaneity.* Some children are reluctant to ask for favors they obviously desire, while others constantly make demands. The following instances show freedom in asking for what is desired:

This child was so fond of the Seguin Form Board that he wanted to go on and on in endless repetition. After six trials the examiner persuaded him to try another test. Very fond of Mare and Foal

Test. Asked to do it again and again. After five trials the examiner insisted upon putting the test away, and the child cried out, "Oh wait, wait, I want to look at it."

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Said to piece that would not fit in on Mare and Foal Test, "What's the matter with you, you old bum?" As he finished, he asked, "Shall I do it again? If I don't want to, won't you make me?" "No," the examiner assured him. "Then I don't want to," he decided.

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Much interested in the tests. She exclaimed, "I don't want my lunch today," when it was suggested that she go to lunch.

3. *The amount and type of talking which the child does has presumably some relation to freedom in self-expression.* In the test situation we find all types of children, from those who talk constantly to those who refuse to speak at all. The following examples illustrate the different types encountered :

This child seemed very dull. She was slow-moving and did not realize her failures. She used only one word, "Yeah," and said it frequently, whether it was appropriate or not.

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This child talked constantly. Was keenly alert to new words, and repeated with evidence of much relish the ones the examiner used. She even imitated the mannerisms of speech she noticed in the examiner.

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This child hummed as she worked. She evidently had a good musical ear. Her mother said she had sung before she had talked.

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This child was silent throughout the examination. Her sister said she talked at home, but that it was chiefly baby talk.

4. *The intensity and pitch of the child's voice in talking, while necessarily requiring subjective estimates, are nevertheless roughly differentiating.* Some children speak in loud tones and others never speak above a whisper. The type of training a child has received is no doubt at least partially responsible for this reaction. It is an interesting aspect of personality and merits further study. The pitch of the voice



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may indicate the child's state of nervous tension. A shrill, rapid voice is significantly different from a voice of medium pitch and moderate rapidity, and from a drawling voice.

### IMAGINATIVE TENDENCIES

Many indications of imagination or the lack of it are given during the examination of a young child. The following observations bring out suggestions of this tendency :

Of the Manikin, said, "That's the Gingerbread Man."

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Of grass inset in Mare and Foal Test, "Nis looks like a valentine, it does."

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"This is airplane [of the cross in the Seguin Form Board]. They are going flying." Later, "I'll make a picture show."

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The child built the Little Pink Tower quickly, then pointed with her finger, "Take it down and down and down. It's a steps, see. Here's a man walking up into a big house."

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"Now the horse can walk," he said, with a tone of relief, as he placed the leg piece of the Mare and Foal Test. "They aren't real horses, are they?"

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In building the Six-Cube Pyramid, she said, "That's a house, and that's a window. A little baby can go in."

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This child had no sister or brother. She had an imaginary sister and talked about her frequently during the examination. She told about how she played with her and how when night came she put her to bed. She found many things in the tests which reminded her of her imaginary sister.

### REACTION TYPE TO WHICH THE CHILD BELONGS

Striking differences appear among children in their reaction to the test situation. Some are slow and deliberate, others are calm yet alert, and still others are quick and impetuous.

*Type 1 — Slow and deliberate.* Comments from test records indicate this type:

A very quiet and shy child who worked deliberately. He seemed to use a great deal of thought in working at the problems. He made few errors, in spite of the fact that his time was relatively long.

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Slow-moving child who was sure of himself before doing a thing. In doing the Seguin Form Board, he selected each piece from the pile very deliberately, looked over the board slowly and carefully until he had located the right place, then placed it in the same slow way. He made very few errors.

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This child was very deliberate. He sat and looked for long periods without moving.

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Each piece of the Seguin Form Board was given a gentle little pat by the child as she put it in. She was rather deliberate in all her motions. In the Decroly Matching Game stopped to rest between each placement. Did one large card at a time.

*Type 2 — Calm and alert.* The following notes would seem to indicate children of this type:

A soft-voiced child who seemed well poised. He was frequently amused but not boisterous. He commented on the tests, talking freely, but made a very good time record. His talking did not seem to interfere with his work.

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Interested and alert, yet in no hurry. Was willing to play with each test until he had completed it to his satisfaction. Took great pride in putting the materials away.

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This child was active and interested, begrudging every minute that real activity was not going on. He sat up straight in his chair and meant business with every move. He seemed bored with language tests requiring no physical activity.

*Type 3 — Quick and impetuous.* Children of this type are characterized in the following notes:

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This child was tense and fidgeted as he worked. He was keenly alert and interested, but he made many waste motions in trying to solve the test problems.

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This very active child wanted a new game immediately after finishing a test. Could not bear to bother to put away the materials he had used. He made many grimaces and extra flourishing motions as he worked.

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This child was very tense. He was animated and impetuous. He seemed to work under a constant feeling of pressure. His mother said after the test, in which he had done a superior quality of work, "We almost wish he were not so bright."

The Seguin Form Board and the Wallin Peg Boards offer an interesting opportunity for getting at the child's reaction to a situation involving a speeded response. After giving the test the three times necessary for obtaining the test score, the board is again placed in front of the child and he is told: "This time I want to see how fast you can do it. Put them in just as fast as you can. Hurry now, hurry up, hurry. Get them in quick," etc. The examiner keeps urging and spurring the child on during the whole trial. The time and errors are recorded for this trial, as for the previous ones. The child's reaction can usually be classified into one of the following types:

- (a) Pays no attention to speeding; uninterested and uninfluenced as far as can be observed. Time and errors not affected.
- (b) Definitely affected by speeding; many waste motions, added errors, increased time.
- (c) Definitely affected by speeding; many waste motions, but errors and time not increased.
- (d) Definitely reacts to speeding by increased efficiency of performance, lessened time and errors.

SPEECH DEVELOPMENT

While speech development has not been shown to be definitely related to the intelligence of the child, it should certainly be observed in every examination. The few language tests included in this test series are helpful in making such observations, but the free conversation of the child should also be observed. The type of word combination used should be noted. It is important to observe whether the child usually talks in (a) single words, (b) phrases or very short sentences, (c) short sentences, (d) longer sentences. The distinctness of speech is also important. Does the child (a) mumble unintelligibly, (b) use baby talk, (c) have a special speech defect, (d) talk distinctly and clearly?

Samples of the type of speech used, with an attempt to reproduce all the sound confusions, should be recorded for each child. Examples of different speech tendencies that were noted during the examinations follow:

This child was eager to help. She had a queer way of talking as if she didn't remember exactly the right sound for each word.

J. had difficulty with consonants in her speech. "Say, Mr. Wady [lady], where does dis doe? Oh, dat too big, dat a horsie, dere's a chickie, dere's a doggie."

This orphanage child does not try to talk much, the matron reports. He spoke some during the test. He speaks indistinctly and in a hurried sort of way. It is difficult to understand him. He understands others well. Said, "Da you are. Anoner laha [another horse]."

This child replied to all the Action Agent stimulus words but so indistinctly that only two responses could be understood. She has been only recently admitted to the orphanage and no one can understand her.

This was a coöperative, interested, careful child. He talked intelligently, using good sentences, such as the following: "It's more fun for me than I've ever played. I am taking different ways to do it. Oh, I got the wrong one. There, that's better."

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### DEPENDENCE UPON THE PARENT

The emotional relationship between the parent and the child and the extent to which the child is dependent upon the parent show up not only in the child's refusal to proceed with the test, or in his disturbance at being taken to the examining room, without his parents, but also in his requests for assistance and his general lack of self-reliance, or in other types of disturbance during the mental test.

The following test records indicate the varying types of reactions of children who are too much dependent upon their parents or who have received unwise treatment from them :

This child had a sort of tantrum, crying and demanding her mother. In this case the examiner felt that it was unwise to yield and won out by leaving the child alone in the room for a few minutes. The child then gave perfect coöperation and was reluctant to leave at the end of the examination.

Little Anna refused to touch the tests; she sat pouting. The child's mother was in the room. "Now, go ahead, go on and play the games for the lady; go on, do you hear. You're a bad girl. Don't you want that ice-cream cone? Go on now," the mother urged. She was asked to leave the room, and almost immediately after she left the child changed and responded with interest and coöperation.

This child was of a very quiet, responsive type. He was fascinated by the Seguin Form Board and wished to do it again and again. The blocks were all placed in the board, then it was raised, and the pieces were dropped with a loud crash which seemed to appeal to him very much. Suddenly he bethought himself, "That noise will make my mamma have a headache."

This child was uncoöperative at first. He seemed very self-conscious. His father was invited into the room, and the child became much more alert. His father's encouragement seemed to give him a new attitude. The father managed the child wisely.

This little boy objected to coming up without his mother but let her leave when he saw the box of games. He was insatiable in his demands for each new game. He had been bribed ten cents for coming and was eager to get downtown to spend it.

This child, 27 months old, had a crying spell and was very resistant after being taken upstairs away from her mother. Finally her mother was admitted, and better results were obtained. The mother states that the child has never had contact with persons outside the family.

This 4-year-old child has been showered with the attention of adults. She developed a hard crying spell and vomited froth three times trying to gain her point of going downstairs. The child's mother came up. The test proceeded with great dawdling. The two or three times the child actually concentrated, she gave an excellent performance.

The following schedule of the traits just described is included to indicate one possible way of recording the personality observations made during the mental examination:

### **RATING OF PERSONALITY TRAITS IN MENTAL-TEST SITUATION**

*Name* ..... *Age* ..... *Date* .....

**1. Self-reliance :**

extreme; moderate; average; slightly lacking; markedly lacking

**2. Self-criticism :**

extreme; moderate; average; slightly lacking; markedly lacking

**3. Irritability toward failure :**

extreme; moderate; average; very slight; none

**4. Degree of praise needed for effective work :**

Type 1 — moderate praise helpful

Type 2 — indifferent to approval

Type 3 — praise induces self-consciousness

Type 4 — constant praise expected, but harmful

Type 5 — constant praise needed

**5. Initiative and independence of action :**

marked; average; very little

**6. Self-consciousness :**

not conspicuously present; conspicuously slight; inhibited reactions; showing off

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### 7. Spontaneity and repression :

1. *Freedom in work*: marked; average; very little
2. *Tendency to ask for what he wants*: marked; average; very little
3. *Amount and type of talking*: talking to self; talking to examiner only about tests; talking to examiner about many things; singing; answering questions only; not even answering questions
4. *Intensity and pitch of voice*

### 8. Imaginative tendencies :

marked; average; very little

### 9. Reaction type to which the child belongs :

- Type 1 — slow and deliberate  
Type 2 — calm and alert  
Type 3 — quick and impetuous

### 10. Speech development :

1. *Length of sentence*: single words; phrases or very short sentences; short sentences; longer sentences
2. *Distinctness of speech*: mumbles unintelligibly; uses baby talk; has a special defect; talks distinctly and clearly

### 11. Dependence on parent :

present; not observed; reactions indicate independence

### 12. Other observations :

As stated before, this list of traits and illustrative observations is by no means intended to be complete. It is merely offered as a suggestion of the possibilities of using the test situation for the study of personality. While the test situation has the advantage of offering a standard setting in which to study the child and gives an opportunity to compare his mental development with that of other children of the same age by the observation of a number of cases, it offers also a valuable opportunity to size up other phases of the child's development. It is true that the method used at present is extremely subjective, yet the examiner can become proficient in judging crucial personality difficulties and in evaluating the effectiveness of the child's training by accumulating comparative experiences, many of which can be checked by other data.

**PART FOUR**  
**ILLUSTRATIVE CASE STUDIES**





## CHAPTER FIFTEEN

### RELATED FACTORS TO BE CONSIDERED IN JUDGING THE MENTAL LEVEL

UNTIL the student has experienced the actual process of testing children, he is usually not aware of the real value of mental tests, though he may be well versed in their theoretical implications. The possibilities and significance of the test situation take on fuller meaning with each child tested. The good mental examiner must have tested many types of children; so that he has gradually built up a background of values richer and more subtle in meaning than the quantitative scores alone can ever be.

The mental examiner does not apply his testing as a rule-of-thumb procedure automatically sorting children into various groups of average, superior, and inferior according to the scores they have made, any more than does a physician classify his patients into groups on the basis of blood pressure, pulse rate, or any other single physical characteristic. To make an adequate diagnosis, the mental examiner must have a good deal of knowledge of the child's present condition and past development. There are many factors and relationships bearing upon the mental development of the child; many times a sound diagnosis requires months of observation and study. Again, the picture presented may be so typical and so common in the examiner's experience that a short period of observation and the child's performance on a few test items are sufficient to enable the examiner to judge the child's mental level confidently.

The reliance, sometimes exaggerated, placed upon the results of the mental test makes the task of the examiner a serious one. The results of a single examination are frequently considered sufficient to determine the status of a child for the rest of his life. He is adopted, placed in an

institution, sent to special classes, or considered a genius on the basis of the results of a test lasting usually less than an hour. An erroneous diagnosis of mental level often has serious implications for the subject. Deaf children are sent to schools for the feeble-minded, children needing specific medical treatment are put in special classes, and normal children are deprived of foster parents and a home as the result of faulty testing. While these mistakes are fortunately not frequent, a label of definite mental level is far too often attached to a child for life on the basis of very flimsy evidence. The seriousness of these possibilities places upon the examiner grave responsibilities, which should not be assumed without adequate experience and training.

The more important of the factors that should be taken into account in evaluating the child's test performance are considered in the following sections of this chapter. To aid the examiner in understanding the complexities of the problem, illustrative cases are given. Owing to the limitations of space, only those aspects of the cases which seemed to have significance in diagnosing are included in the descriptions given here. The studies presented by no means suggest all the possibilities of mental testing as a means of analyzing the abilities and handicaps of young children. In large measure each case presents its own peculiar complex of factors which must be considered in making the diagnosis and outlining the plan of treatment.

It will be noted that the children whose case studies are presented often illustrate the influence of factors other than that under which the case is listed. Thus, children who have a poor hereditary background often have poor environmental opportunities, and otherwise normal children who appear to be subnormal mentally often present other factors that may have a direct bearing upon the score.

#### HEREDITY

Many studies have shown that the heredity of the child has a definite relation to his mental level. This principle has been accepted so heartily by some persons that they condemn without a hearing children of poor heredity. Children born of mothers in schools for the feeble-minded, for instance, are sometimes kept there regardless of their own mental level, the state recognizing no possibility of a normal child under such conditions. The writer has tested, in schools for the feeble-minded, several children with such a history who proved to have average or superior mentality; yet there was no other place for them to go, for only rarely is anyone willing to take such children into his home.

However, the heredity of the child must undoubtedly be considered seriously in the diagnosis of mental level and in the prognosis for his future. Of two children, both of whom have a low test score and live in an inadequate environment, the child who has a hereditary history of mental inferiority has a much less favorable prognosis than has the child whose ancestors were of average mental ability.

The history and development of the child whose case study follows presented many complex factors, any one of which might have explained his condition. His physical health was far below normal. His environment was unsympathetic and unsuited to his needs. His heredity was decidedly unfavorable. If poor health or an unfavorable environment had been the chief factor in his unsatisfactory test performance, he would have gained in mental level under improved conditions. Many cases in which the hereditary factor of inferior mental ability is present offer no difficulty in diagnosis because there is no conflicting possibility. This case proved difficult to diagnose because of the several possible explanations of the child's poor performance.

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*J. G.*: boy, age 2 years 11 months at time of first examination. This illegitimate child was referred by a child-placing agency for diagnosis as to adoptability. His mother, who was thirty years of age at the time of his birth, had had nine children, fathered by four different men. *J. G.* was the eighth child. The family had only recently come to the attention of social agencies. The mother was diagnosed as "a simple-minded asocial psychopath." *J. G.* was much in disfavor with his mother, who "hated boys." The children were all so poorly cared for that they were taken from the mother and placed in boarding homes, and one by one they had all been examined and found to be of inferior ability.

*J. G.* was a poor specimen physically. He was thin, pale, and small for his age. He was tense and irritable, and decidedly uncoöperative during the examination, even for his age. Rapport was never fully established, though the examiner played with him for a long time. He wandered at will about the examining room, could be held to a set task only with difficulty, and was distracted by every extraneous event. In general, he acted the part of a thoroughly spoiled child, accustomed to win his point by violence. He either threw on the floor the equipment that did not meet his approval or attempted to destroy it. The models built by the examiner as a demonstration he destroyed with a show of anger. The chief trait noted, in addition to his violence, was the tenacity with which he opposed his will to everything presented. A test score could be secured only by taking him unawares. He could not talk. He was most successful in tests requiring manipulation and depending upon a trial-and-error procedure.

The test results, while meager and unsatisfactory on the whole, indicated that the child had failed to develop normally up to the time of the examination. The score of 28 points gave a mental age of 2 years 7 months; this score has

a standard deviation of  $-1.0\sigma$ . It was thought that the personality defects shown and the physical condition of the child might be at least partly responsible for his poor showing. It was recommended that J. G. be placed in a good boarding home for a year, after which final advice about his placement could be given. It was considered that this period of time, if there was an effort to build up his physique in the meantime, would offer ample opportunity to discover whether there was much possibility of improvement.

Accordingly one year later J. G. was returned, at the age of 4 years 0 months, for another examination. The examiner learned from the social worker who brought him to the clinic that he had not had as good care during the thirteen months as the agency that had placed him had hoped he would have. The boarding home had been somewhat inferior, and the child still seemed to be in very poor physical condition.

J. G. played quietly in the waiting room with a collection of toys. He seemed normally interested in what went on about him until he found that attention was being directed toward him, and then he threw his arm up before his face and peered from behind it or scurried to a crouching position behind a chair.

However, he accompanied the examiner willingly to the testing room. At first it was hard to gain his coöperation because of his shyness, but this gradually disappeared as he became interested in the tests. He was extremely nervous throughout the examination, starting at the slightest sound from the hall outside. He responded to speeding by becoming very much flustered and doing markedly poorer work. His command of language was meager. He was unable to answer questions usually answered by children of 2 years. He failed the Color-Matching Test and was weak in visual discrimination of form, following a trial-and-error method in solving such tests. He was very observant, however,

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and several times during the examination stopped to look at the pictures on the test materials.

The total score this time was 41 points, giving him a mental age of 3 years 1 month and a standard-deviation standing of  $-1.5\sigma$ . During the thirteen months that had elapsed since the first test he had gained 6 months in mental age. There was little or no improvement in the personality difficulties he had shown the previous year, and certainly no improvement in his general level of ability. He showed more self-consciousness, with the attendant lack of adjustment, than he had shown the year before, and though he was more responsive to the test situation, he was more timid and withdrawn into himself than before. Though the obvious inadequacy of J. G.'s home treatment and his extremely poor physical condition still made the results a somewhat unreliable indication of his capacity for development under better conditions, the total picture of the child and his poor heredity did not yield much hope of his ever attaining more than an inferior mental development.

*P. F. : boy, age 1 year 10 months.* Fortunately, the hereditary data are not always unfavorable. The following case illustrates a problematic situation involving good heredity. The unusual circumstances of this child's heredity made it imperative that the child-placing agency have expert opinion on the child's mental ability, in spite of the fact that he seemed to be a bright, normal boy. His mother, while attending high school, had been living in the home of an older brother who, under the pretext of giving her sex instruction, had intercourse with her, resulting in her pregnancy. The brother was a responsible, respected person in his community, and the family were respectable and proud of their standing in their home town. The matter was hushed up, and when the child was born the family decided to place him for adoption. The child-care agency hesitated to take such

a child and delayed decision until the child was 22 months old, when he was brought to the Consultation Center for a mental test.

A careful study was made of the child's heredity. There had been no mental disease or feeble-mindedness; the ancestors had been self-supporting, and from the occupations in which they had engaged it could be inferred that they had been somewhat above average in intelligence. There had been a consistent tendency toward musical talent in the family. All the family members of the present generation could play some kind of musical instrument, and the child's mother was exceptionally fond of music and played very well.

P.F. was an attractive, well-nourished, and alert child. He was coöperative in the test situation and showed good coördination and concentration, working industriously on any task proposed. He readily comprehended what was required and started some of the tests before directions could be completed. A thoughtful working out of the problem enabled him to complete the Nest of Cubes Test in 81 seconds, though he had little idea of relative size. He had decided preferences among the tests, refusing to do some because he preferred to do others. He refused to build a straight tower because he preferred to put the sixteen cubes in the box, which he insisted upon doing several times before he was willing to undertake anything else. He worked for a long time trying to cut with the scissors and cried when the examiner finally took them away in order that he might complete the other tests. His language development was good for his age. His total score on the scale was 14 points, giving him a mental age of 25 months and a percentile rank of 80.

P.F. was fascinated by a toy music box with which he was permitted to play. He showed unusual sensitivity to



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any kind of sound. Occasionally during the test he got up from his chair to investigate the source of sounds.

In spite of the close relationship of the parents, the child seemed to bear no indications of abnormality. He was well endowed mentally, was in fine physical condition, and was developing an attractive personality. There was no history of abnormality in the family, and there was an indication of unusual musical ability. The child was accordingly recommended as a safe risk for adoption and was placed in a good foster home. The latest report indicates that he is adjusting well to this home and that the placement seems entirely satisfactory.

### PHYSICAL CONDITION

In many cases the examiner may suspect that the physical condition of the child has had a definite part in fixing his mental level; yet, unless there is an improvement in the child's physical condition, accompanied by a better performance on a second test, such a judgment cannot be considered valid.

*B. F.: boy, age 12 months at the time of first examination.* The behavior of this child had excited the suspicion of the social visitor and the boarding mother. The child-care agency decided that a mental test was necessary in planning for his future. At the time of the mental examination B. F.'s responses were characterized by an unusual hyperactivity. He had a blandly pleasant expression most of the time and seemed to have no objection to coöperating in the tests to the best of his ability; but his movements, though not excessive or rapid, were constant and dully exploratory. He put various objects in his mouth, reaching for another object when the one he had was removed. He moved his body frequently and shifted about in his chair to the extent of falling off when he was left unguarded for a moment. At

times he threw his head and neck backward in a peculiar way. He had apparently little sensitivity to pain, for though he had two or three rather severe bumps during the examination he cried little. He seemed to gain no sense of caution from his mishaps. He was reported as having frequent falls, and his face bore the marks of several of them.

On the Gesell developmental tests the child was able to do 8 of the 10 tests of C grade at the 12-month level, and 10 of the 15 tests of B grade. He was not successful with any of the B<sup>+</sup> or A tests. This performance ranked him as slightly below average. He did not respond positively to any sort of command. His only response to the cup, spoon, and plate was to put each one of them in his mouth. He could not take a third cube without dropping one of the other two.

On the Kuhlmann-Binet series B. F. was able to do all the tests at the 12-month level, though his success in one of the tests — marking with a pencil — was doubtful. All the tests at the 18-month level were obviously too difficult for him. On this test series, therefore, his performance gave him a mental age of 12 months and an IQ of 100.

B. F. was found to need circumcision, which need it was thought may have aggravated his excessive tendency to motion. It was recommended that he be circumcised and also that he be given a careful neurological examination. While the child was not seriously retarded in mental development, he did not seem to be normal. It was suggested that he be returned after one year for another examination before a final decision as to his adoptability was made.

The child-care agency accordingly placed the child in the hospital for a neurological examination and circumcision. The neurology department reported that the child was too young for an adequate examination, but that he seemed subnormal. He was kept in the hospital until after circumcision and then placed in a good boarding home. One

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month later the agency visitor reported that the child was apparently much less erratic in his movements and no longer bumped his head and threw it back as he had before.

One year later, at the age of 2 years, the child was brought back to the clinic for another mental test. He was then an attractive, chubby youngster who came eagerly into the examining room. He was greatly pleased with the test materials. He seemed hungry for games and toys and did not want to leave when the examination came to an end. He was persistent to the point of stubbornness, refusing to undertake the next test until he was tired of the one he was doing. He made a quick adjustment to his surroundings, familiarizing himself with the equipment and helping to put it away. On the Merrill-Palmer scale he made a score of 16 points, which gave him a mental age of 26 months and a percentile rank of 70. He showed originality and constructive ability in his response to the tests and a keenness of observation above the average. He had an engaging personality. There seemed to be no reason to consider him as other than a desirable child for adoption.

It seems possible that the erratic responses of this child at the time of his first examination were due to the need for circumcision. His behavior at that time was so unusual that the neurologists considered him abnormal, but this unusual behavior had practically disappeared, according to the social worker, one month after he had been circumcised.

*J. D. and D. D.* Mrs. D. brought her two children to the Consultation Center to be tested. Both were foster children and both had been in their present home since infancy. D. D., the older, had been taken at the age of 6 weeks. He had been a comparatively easy child to rear. He had had few illnesses, and there had been no difficulty in feeding him. He was obedient, considerate, sensitive, and eager for approval. His only handicap was a somewhat excessive shy-

ness with strangers and a lack of social initiative. He had proved so desirable a child and so well fitted to the home in which he had been placed that final adoption papers had been made out. The father in this family had little patience with the younger child, J. D., a girl, but D. D. was a decided and obvious favorite with him and, from his point of view, seldom wrong.

J. D. was of a more aggressive, restless temperament. She had been in her foster home since the age of 2 months. From the beginning she had been more difficult to care for than D. D. Feeding her occasioned a great deal of trouble, and she was cross and fretful. She had never liked milk and had always resisted drinking it. She walked and talked at a later age than D. D. did and was more difficult to train for the toilet. At the age of 4 years she still had both diurnal and nocturnal enuresis. She had been ill a great deal more than D. D. In the conflicts she had with D. D., J. D., who was less retiring and sensitive, usually emerged the victor; D. D. would rather yield a point than make a disturbance. Both parents were therefore inclined to favor D. D. in such a circumstance. J. D. had a habit of stamping her foot and screaming to get what she wanted, which was disagreeable to her peace-loving foster parents.

From the mother's description of J. D. and her discussion of the difficulties she had with the child, it was apparent that she, as well as the father, was more fond of D. D. than of J. D. J. D. had not yet been formally adopted, and the mother said that, while she and her husband were very fond of the child, they had questioned whether they should adopt her in view of her numerous handicaps. The mother was inclined to be reasonable about the situation. She had been worried about it and wanted to justify her decision about the adoption.

D. D. was 5 years 10 months old at the time of the first

examination. On the Stanford Binet test he had a mental age of 6 years 10 months — an IQ of 117. Physically he was a beautiful child, with especially fine hazel eyes which varied in coloring as his mood changed. He was entirely coöperative and showed much interest in the tests. He noted and commented upon the objects that surrounded him in the examination room. The fact that the examiner was filling out “a book all his own” interested him, and he once said, “If you don’t watch out, your book will be all used up.” He pointed to a red peg board on top of the bookcase and said, “I know what that little thing is that is painted red. It is a thing that is like those on top of telegraph poles.” He talked fluently and clearly, and his conversation fairly bristled with ideas. He was persistent and had more than average initiative. At the beginning of the test he was a little timid, but grew bolder as his confidence was built up by his success with the tests. On the Merrill-Palmer scale D. D. made a perfect score of 93 points. His resourcefulness was especially evident during this test. He carried on a constant conversation, which was difficult to record because of its fluency.

J. D. was 4 years 0 months old at the time of her first examination. She was a fairly well-developed child, rather tall for her age, with light hair and an attractive face. She displayed a great deal of energy throughout the examination. She was easily distracted and tended to give up any test that was at all difficult for her. On the Stanford Binet scale she had a mental age of 4 years 6 months — an IQ of 112. She did well with the tests involving language comprehension but failed most of those involving judgments of form and number, such as copying a square, the patience test, repetition of digits, counting four pennies, and naming coins.

There were wide discrepancies in J. D.’s performance on the Merrill-Palmer series. She answered seventeen of the

Action Agent questions correctly and made a time score of 105 seconds on the Mare and Foal Test. She could not put the Nest of Cubes together in the right order and left out one of the cubes in building the Little Pink Tower. She had no idea of how to put together the picture puzzles, calling them "animals." She made a total score of 53, giving her a mental age of 3 years 7 months and a percentile rank of 26.

Throughout the examination J. D. showed a tendency to become irritated if she was not immediately successful. As she worked on the Seguin Form Board, she said in a fretful tone, "How does this come in? You put it in; I can't." She worked hard at the task, however, while she was working. She made many waste motions, especially when she was speeded on a fourth trial of the Seguin Form Board. She was easily excited. She was rather awkward in buttoning the button strips. She buttoned two buttons of the four-button strip, but it was too much for her when they came undone; she wadded up the strip and threw it on the table in great irritation, saying, "I don't know how to." When persuaded to attempt it again, she worked for a short time and again threw the strip away, looking somewhat ashamed as she did so, but refusing to continue the task. J. D. lacked self-criticism, realizing her failure only with the four-button strip.

J. D. tended also to make peremptory commands in an insistent tone, which suggested that she was imitating someone at home. Mrs. D., when questioned, admitted that she had managed the child too much by commands, an unnecessary method, since J. D. was inclined to yield readily to suggestion.

J. D. seemed too much dependent upon her foster mother. She often asked for her during the examination and seemed to be afraid that her mother would leave her with the examiner.

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It seemed likely that she sensed the possibility of not being kept in her present home.

D. D. and J. D. were given a physical examination by the pediatrician at the Consultation Center. D. D. was reported to be fairly well developed and well nourished. There was some indication of a slight cold. His heart was normal. He had all his temporary teeth; they were in fair condition, with a moderate tartar deposit. J. D. also was reported to be fairly well developed and well nourished. Her tonsils were enlarged, ragged, and infected. The submaxillary glands and the thyroid were enlarged. Her heart was normal. The skin of her hands was coarse and heavily lined, which suggested a possible lowered thyroid function. Iodine for the thyroid condition and tonsillectomy were recommended, and the mother was asked to see the family pediatrician about both conditions.

A year later Mrs. D. brought the children in again. Immediately upon arrival she began to tell about the wonderful change in J. D., who had taken iodine during the year, though her tonsils had not been removed. All the worst difficulties had either disappeared or were much improved. She no longer stamped her foot and screamed to get her way. The improvement was so marked that Mrs. D.'s friends had commented upon it. Mrs. D. said that she had changed her method of training the child; she no longer commanded and insisted, but used more patience and stuck to her point till she got results. She said that J. D. seemed to yield readily to reasonable suggestion. Mrs. D. had been pleased by signs of thoughtfulness for others in J. D. She thought that J. D.'s motor coördination had improved greatly during the year. Though there were occasional lapses, the enuresis was much improved. Her eating habits had improved, and she was willing to drink milk. The father had become much more tolerant and sympathetic toward her. J. D.'s

attitude toward D. D. was now better than his toward her. She was always willing to share with him, and always thought of him when she had money to spend.

It was clear that J. D.'s desirability had gone up tremendously during the year. Mrs. D. said that if there were any question of choosing between the two children now, she would choose J. D. She felt she was fortunate in having two such attractive foster children.

D. D. was giving his foster mother some concern because of his occasional sulkiness and excessive shyness. Mr. D. was extremely self-conscious and could never appear before a group in public, and Mrs. D. was afraid that D. D. was developing the same trait.

Both children were again given mental tests.

D. D. was at this time 6 years 10 months. Since the boy was too old for the Merrill-Palmer test, only the Stanford Binet test was given him. His score gave him a mental age of 7 years 10 months — an IQ of 114. He was as coöperative and alert as before. There was no outstanding change in his response.

J. D. was 5 years 0 months at the time of the second examination. She was very coöperative and attractive. She entered heartily into the tests and seemed to enjoy them a great deal. Toward the end of the second test, which was the Stanford Binet test, she began to show signs of fatigue; her responses then became more careless and she became somewhat restless but not irritable or uncoöperative. The results of the last part of the examination probably underestimate her ability.

J. D. showed a marked improvement in the Merrill-Palmer test. Her total score was 81 points, giving her a mental age of 5 years 6 months and a percentile rank of 65. She showed less skill in handling test objects than in quick judgment of form and size. Speeding on the Seguin Form Board



did not disturb her, and she reduced her time score markedly when speeded. She made good scores on the button tests and said, "The other time I was here I didn't want to button those things, 'cause I was four last time."

On the Stanford Binet test she made a score giving her a mental age of 5 years 6 months — an IQ of 110.

At this time her mental age was the same on the Merrill-Palmer and Stanford Binet tests. During the year she had made greater progress in motor skill than in language comprehension and verbal ability. She had gained 23 months' mental age on the Merrill-Palmer test and 12 months' mental age on the Stanford Binet test during the 12 months.

*J. S.: boy, age 3 years 11 months at time of first examination.* The tired and worried mother of this child had been referred to the Consultation Center by a city health clinic. Her son was quite unmanageable. The doctors who had examined him had found little wrong physically and considered the case chiefly one of poor training. The child had been normal at birth, as far as the mother had been able to determine. He had been breast-fed for seventeen months. Practically no solid food had been given until the end of the first year. He had had broncho-pneumonia at the age of 7 months; the recovery was seemingly uneventful. No other diseases had been recognized. He had been given no cod-liver oil and probably had moderate rickets. His diet was somewhat unbalanced, containing too much meat, pie, pastry, and sweets. He had walked at 14 months and until that age had been apparently normal and easily manageable. His mother admitted that from that time there had been an increasing tendency to "let him have his own way."

The family history was negative or unassociated with the child's condition.

J. S. was examined by the Consultation Center pediatrician, who made the following report :

The child seemed to have abnormal interests. He would not sit still, and he objected to every command. He said no words but made sounds like those an infant makes before it is able to talk. It was so difficult to examine him, owing to his behavior, that the pediatrician was unable to get some of the information he needed. He found the child fairly robust and of normal size for his age. The general development was average. His fingers and toes were short and stubby. He had slight knock-knee and flat-foot. He had twenty well-formed teeth, but the dental arch was deformed by finger-sucking. The thyroid was barely palpable. The chest, lungs, and heart were apparently normal, though the behavior of the child made it difficult to determine their condition. The abdomen was normal. There was a slight hypospadias.

The pediatrician believed that the case was chiefly one of poor management, though he thought there might be a slight endocrine disturbance.

An interview with the mother revealed that she and her husband had disagreed about the discipline of the child, and that she had given up any real effort at control. The child had tantrums on the slightest provocation. He did not talk, but squealed and jabbered in an excited way most of the time. The mother thought something was wrong with the child, and had an idea that he had been hurt while an infant. He had slept most of the time when an infant, night and day, and the mother had never had to be up with him at night; he was never still, however, while he was awake. He still took a two- or three-hour nap during the day. He had cried very little when an infant but now cried very often. He could do nothing about dressing himself. He had a Kiddie Kar but could not learn to manage the pedals, and his mother could not teach him. A few days before the examination he had burned himself by backing into a hot stove. He did not cry or complain very much, though the mother found later that his skin was rather badly blistered.

The mental examination of J. S. was accomplished with much difficulty. He expected his mother to accompany him to the examining room, and when he found that she was not coming he had a tantrum on the way. His mother told him that he would have "lots of little boys" to play with in the examining room, but this deliberate untruth had no effect and he had to be carried there. The entire examination was interrupted by tantrums. If the child did not at once get what he wanted he screamed and squealed, holding his hands out toward the object he desired. When he saw objects to play with, he became excited and ran to grab them. It was difficult to get him to sit in his chair and wait until the object was handed to him. He had a tense, resistant attitude and made very quick movements. The usual experience in administering one of the tests to him was as follows: The test material was presented, but before any directions could be given the child clasped the material in one arm and began reaching for more with the other, squealing continuously. When more was refused, he had a tantrum, yelling and kicking and throwing objects already in his possession helter-skelter over the floor. The examiner refused to show him more material until he picked up the objects on the floor. It did not take many repetitions of this procedure to teach the child that his behavior was unsuccessful, and he was then persuaded to attempt a few of the tests. He did the Seguin Form Board successfully twice, though it was difficult for the examiner to hold him down to the task and he required much urging and encouragement. He made many extraneous moves, making sudden dashes for other objects; the examiner had to intercept these moves, telling him that he could have nothing else until he had finished the task in hand. Often the examiner found it necessary to hand the child one of the Seguin pieces, instructing him to put it in the board. He completed the

first trial in 465 seconds and was then prevailed upon to make a second trial; this time he completed the task in 237 seconds. He then refused most emphatically to attempt the task again, knocking the blocks over the floor and attempting to destroy the boxes and other equipment.

He thought the Little Pink Tower was candy and paid no attention to directions. He put the smallest block in his mouth, with a pleased smile, but finding it tasteless withdrew it and knocked the outfit over the floor. He could not be persuaded to try again.

The examination lasted about 90 minutes. Most of this time the child spent in tantrums and squealing. The examiner spent the last part of the period observing the child in self-directed activity. During this time he turned from one thing to another, threw things about, did not settle down to any self-imposed task, and exhibited no constructive activity. He made no attempt to enunciate words. He could understand spoken words and was keenly sensitive to sounds; he was distracted by every sound in the hall.

The quantitative results of the examination were so meager as to be scarcely reliable, but a score of 36 on the Merrill-Palmer test was obtained, giving the child a mental age of 34 months and a percentile rank of 3, with a  $-2.0\sigma$  standard deviation.

It was clear that the child presented a definite behavior problem and that better home discipline would have helped the situation, but the examiner believed there was a more fundamental problem which required further analysis. Though the response was certainly that of an abnormal child, it was apparent that the case was not one of simple amentia. The mother was given help in working out a more adequate home régime. She was given the names of two or three specialists in endocrinology and was advised to consult one of them concerning a possible endocrine disturbance.

Nine months later the mother returned for further help. She had followed fairly well the directions for managing the child at home, but had not consulted an endocrinologist. Her husband had been transferred to another city in the interval and had been there only a few months when he became ill and died; the mother had then returned to her old home. Since her return she had been advised by a teacher of the deaf to send her boy to a school for the deaf when he reached his sixth birthday. He was reported as much better behaved than he had been nine months earlier. He had finally been fairly well trained for the toilet and was able to dress himself partially, but he was still subject to violent changes of mood.

J. S. was now 4 years 8 months of age. He was much easier to manage than he had been before, though he still showed a marked excitability and hyperactivity in the test situation. No sooner had he opened one box than he wanted others; he clutched the one he had, showing no interest in examining it further, and pointed eagerly toward the others. Beckoning to these other boxes, he would suddenly slide off the edge of his chair and dash back of the table to grab them. If he was intercepted and seated again on his chair, the excitement soon wore off and he settled down for a period of concentrated effort. These periods were characterized by fair motor control, a fair ability to judge size and shape, and learning of a type far superior to simple trial and error. During these periods he seemed interested and coöperative and of about average ability for his age. They lasted for only a short time, however, and were usually followed by periods of rather aimless trial-and-error performance, an increasing loss of interest, and finally a discarding of the material and a demand for other boxes and a repetition of the period of hyperactivity. During these periods of hyperactivity he seemed to be overcome by a frenzy of desire.

His muscles stiffened, he made wild motions toward the objects with his arms, and his face was distorted; his response was entirely different from the usual one of a child who is not getting what he wants. Since he responded in this way to most of the tests, his score did not reach the promise of his clearer moments. No language tests were given, since he could not talk. He apparently understood directions readily. He attempted to say words, such as "bah" for "box," and said several poorly enunciated phrases. His inability to talk seemed to be connected with the use of his tongue. At this time he made a score of 49 points on the Merrill-Palmer test, which gave him a mental age of 40 months and a percentile rank of 2. During the 9 months he had gained 6 months in mental age.

The whole picture seemed to indicate some mental or nervous disease, and it was decided that the next step was a thorough psychiatric study of the case. An outstanding psychiatrist was told of the case and became interested in the boy, who was placed under observation in a hospital. A careful analysis was made of his condition. The following extracts from the report of the psychiatrist indicate his findings :

At the time I first saw this patient the two things that stood out most prominently in the examination were his inability to articulate and the character of his muscular movements. It was apparent that he comprehended what was said to him and that he initiated ideation for the formation of speech but that the motor control of speech was defective. This symptom is not unlike that seen in lesions of the lower part of the motor cortex. His movements were dartlike and poorly inhibited, with slight asynergic quality, which made one suspect cerebellar involvement. While the child was in the hospital, the routine physical examinations were negative. He had two X-ray examinations of the head, both of which showed evidence of increase in intracranial pressure. The sella turcica was normal in outline and size. Cerebrospinal fluid examination showed an increase in globulin and an increase in cells. The cell count was 28 mononuclears per cmm.

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Pituitary extract and Fowler's Solution were prescribed for the child. Two weeks later the psychiatrist saw the child again. His report at this time was as follows:

There was a marked improvement in the character of his movements. He was more nearly normal in that the dartlike quality and extreme restlessness had very largely disappeared. There seemed to be some improvement in speech. The same medicine was ordered to be continued. I do not believe I can give a definite disease terminology for this case. I believe that there is a definite organic change within the brain. The increased cell count in the cerebrospinal fluid and the increased globulin make one think of a chronic low-grade infective process of the brain and meninges. The increased intracranial pressure might very well be produced by such a low-grade encephalitis. The Fowler's Solution I ordered for him is on the assumption that that is what is taking place in his head. The pituitary extract was largely for the purpose of altering his endocrine balance rather than for the specific purpose of increasing his pituitary production.

The psychiatrist asked the mother to bring the child in at intervals of two to three months to have the cerebrospinal fluid reexamined. He thus saw the child from time to time, and reported excellent progress. He said that he considered the case by no means hopeless, and had in mind a child who had displayed similar characteristics a few years before and who was now nearly normal and undistinguishable by ordinary observation from other children of his age.

Simple amentia is rather easily recognized by the experienced mental examiner. From the first, J. S. had not presented such a picture. His performance during his occasional periods of lucidity, which was so like that of a normal child, was certainly quite unlike the dull, plodding efforts of the child with simple amentia.

Far too frequently these unfortunate children who are suffering from rather obscure physical complications are diagnosed as presenting no physical disorder, as revealed

by the routine physical examination. Unless the mental examiner is alert to all the symptoms presented, the difficulty is likely to be wrongly diagnosed, with serious results for the child.

#### HOME ENVIRONMENT AND OPPORTUNITIES FOR DEVELOPMENT

The child inherits definite possibilities of development, and his actual development in many respects falls far short of the possibilities. His innate abilities are called forth only by appropriate stimuli. If he is restricted in opportunities, handicapped by lack of training, and lost in a maze of emotional maladjustment, he cannot be expected to respond to the test situation as well as he might have done under more favorable circumstances.

Practically every child brought to the clinic has been influenced by certain environmental factors that in all probability affect the test score unfavorably. To say, therefore, in selected instances, that a certain environmental factor has produced a certain effect upon the test score is usually impossible. In the analysis of a case it is difficult to say what relative influence the various factors involved have had. Most of the cases presented in this chapter, therefore, illustrate only the necessity of considering the home environment and the opportunities for development rather than any specific effect of these factors upon the test results.

The two cases immediately following perhaps illustrate better than the others the effect of environment, as indicated by the change in the child's mental level following a change in environment.

*L. B.: boy, age 13 months at time of first examination.* From the social visitor's description of the home of the mother of this illegitimate child and of the mother's parents and siblings, it is probable that what the visitor called "a very ordinary intelligence" in the mother was really a border-



line intelligence. The mother's siblings had been slow enough in school to lead one to suspect dullness. One brother was examined and was found to have an IQ of 65. An examination made during the mother's pregnancy showed her to have an IQ of 64. The mother was reported to have reached the eighth grade in school and to have left at the age of sixteen. The personality traits of both the father and mother of the child appeared to be desirable ones. The child was reported as having been on the whole a healthy baby. He had been cared for by the mother in her parents' home until one month before the child's mental examination, when he was placed in a temporary boarding home pending a more permanent placement.

L. B. was not a particularly attractive child. On the day he was brought for examination his unattractiveness was furthered by his ill-humor and listlessness. He was seen shortly after he had been fed and was aroused to effort with difficulty. He made no vocalizations and would not frolic as most children of his age do. He petulantly disregarded most of the material presented to him and showed only slight interest at best. His listlessness was so predominant that the examiner asked for information about his behavior at home, but this information the social worker who brought him was unable to furnish.

On the Kuhlmann-Binet series L. B. did the test items at the 6-month level without undue effort or persuasion from the examiner. The tests at the 12-month level were much more difficult for him. He made no spontaneous vocalizations and showed no recognition of objects. He was able to sit and stand, mark with a pencil, and imitate simple movements such as shaking a rattle. On this test he had a mental age of 9.6 months and an IQ of 77.

He was then tested to see what he could do with the Gesell Developmental Schedules. At the level corresponding most

closely to his age, the 12-month level, he was able to do but few of the expected things, and these were almost all of C grade. He was able to do the tests at the 9-month level with no failures on either the C or B tests. He was able to play purposefully and to respond to the examiner's overtures, and he showed an intelligent interest in the examiner's attempts to win his coöperation in the simpler situations presented.

At this time it was decided that, though he was still too young to permit a prediction to be made with any degree of certainty, the chances for normal mental development were slight, in view of his retardation and the maternal history. The child-care agency was advised to place the child in a home where he would have good care for the next twelve months, and to return the child for a retest at that time before making any permanent plan for his future.

The child was placed in an excellent boarding home, and the reports about him were encouraging. At the end of seven months he had made such strides in development that the agency asked permission to return him for another examination. He was 21 months old at this time.

L. B. went to the testing room without protest, walking very steadily. When climbing the stairs, he put his hands on the steps to steady himself. He climbed off his chair and on again several times during the examination. Altogether, he showed good motor development. He was interested and alert during the examination. He observed many objects in the room and pointed to and wanted the pictures on the desk.

He was given the Merrill-Palmer test. He was much interested in the test boxes and opened them as fast as he was permitted to do so. When the steam hissed from the radiator, he went over to investigate and tried to imitate the noise. When the tests were presented, he readily under-

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stood the directions and did things as soon as he was told. He showed no signs of temper or irritability, even when the tests were hard for him. He made a score of 12 points, which gave him a mental age of 23 months, with a standard deviation of  $+1.0\sigma$ .

At this time the following report was sent to the social agency which had referred him to the clinic for examination :

L. B. has shown that unexpected rapidity of improvement which occasionally occurs in young children. The case illustrates the necessity of following the child's development over a year or so, especially if the child is under 2 years of age when first tested. The physical and environmental factors are hard to gauge, and the available tests are difficult to interpret at such early ages.

At present, L. B. 's development compares favorably with that of other children of the same age. It is quite possible now to say that L. B. will probably be of average mentality. His hereditary background is unfavorable, and he should therefore be retested after he is 3 years old before final adoption papers are made out.

Three years later the following report was obtained from another clinic in the state :

You will be interested in the reexamination of L. B. He has been adopted and has developed into an alert little fellow in many ways.

He was 4 years 8 months old at the time of this last examination. On the Stanford Binet test he had a mental age of 4 years 4 months and an IQ of 93. He did not do so well on the tests of motor coördination as on the tests of language ability and ideation. He made rather low scores on the Mare and Foal Test, the Lincoln Hollow Square, and the Seguin Form Board. In general he showed a normal level of intelligence and good social adjustment. He revealed a lack of the ordinary information the child usually picks up at home. The only color he knew was red, and his lack of acquaintance with a pencil was evident. The psychologist interviewed the foster mother and endeavored to secure

her coöperation in giving the child better opportunities for development at home, but the mother did not understand and was not interested. The psychologist concluded that, "On the whole, it would seem that the child is superior to his foster mother in caliber, and that she will hamper rather than develop him if her present attitude continues."

*J. E.: boy, age 3 years 1 month at time of admission to the Merrill-Palmer nursery school.* J. E. came from a home that offered little stimulation for mental development. His father was ignorant and could speak very little English; his mother was deaf. The home was clean, however, and the children were kept clean. J. E. was the second child. From the time the child was an infant the mother had been given assistance in planning his diet, and he had been given physical examinations by the school pediatrician. The home discipline was not satisfactory. It was hard for the deaf mother always to understand the situation, and she tended to let the children do as they liked. They usually ate when they pleased and, as long as they were not annoying her, did what they pleased.

In the physical examination J. E. was rated "poor." He had prominent scapulæ, rounded and forward shoulders, marked knock-knee, and pronated feet. His teeth were in bad condition, he had bad breath and was a mouth breather, and his adenoids needed to be removed. His thyroid was slightly enlarged. The heart had an irregular beat suggesting vagus irritation. He had a prominent abdomen, thin muscles, a dry skin, and circles under his eyes. He was tall for his age and underweight for his height.

J. E. was given the Merrill-Palmer test at the age of 2 years 1 month, one year before he entered the nursery school. At this time he made a score of 8 points, giving him a mental age of 21 months and a percentile rank of 10.

He was retested at the age of 3 years 3 months. At this

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time he made a score of 40 points, giving him a mental age of 3 years 0 months and a percentile rank of 25. He had entered the nursery school one month before.

J. E.'s behavior in the nursery school reflected his lack of home training. He did nothing for himself. He frequently stood around with his thumb in his mouth, watching the other children play. He was destructive with the play materials, hyperactive, and lacking in concentration. He enjoyed pushing the other children and used any method, pulling hair, pushing, or hitting, to get play materials.

At 3 years 6 months of age J. E.'s mental age on the Stanford Binet test was 3 years 2 months; his IQ was 90. He was very active and constantly on the move. His energy, both verbal and physical, was often misapplied. His attention was too easily diverted from the original stimulus to permit him to follow up his curiosity.

Continued attendance in the nursery school produced some change in J. E.; he became more attentive and more socialized. At 4 years 1 month of age he was given the Merrill-Palmer test again. This time his score was 68 points, giving him a mental age of 4 years 4 months and a percentile rank of 70. He was coöperative and keenly interested in trying each new box to "see what games are in there." He still lacked perseverance. If he was not able to do a task at once, he said, "I can't," until he received further encouragement. The examiner recommended that special effort be made to train the child in self-reliance.

At the age of 4 years 6 months J. E. was given the Stanford Binet test again. His score gave him an IQ of 100. He was reported as being very suggestible and lacking in self-confidence. He continued to say, "I can't," frequently and moved about in his chair a good deal. He was satisfied with inferior responses and required much encouragement and praise.

The Merrill-Palmer test was given again one month later, when he was 4 years 7 months old. He made a score of 72 points, giving him a mental age of 4 years 8 months and a percentile rank of 53.

At about this time, during his last few months in the nursery school, J. E. was reported as showing some originality in his play. He was still somewhat ruthless in getting what he wanted and seemed to enjoy teasing the little children and hearing their shrieks when he did so, though he usually played with the older boys and seemed to get along with them well enough. He did not allow other children to take things away from him. He lacked persistence in play and was restless, often jumping and running about with no definite purpose in view. He was not outstanding in any of his abilities. The stories, poems, and music in the nursery school program seemed to give him real pleasure. There was little change in his home environment; the parents were doing their best to coöperate but were hindered by ignorance, a foreign-language handicap, and the mother's deafness.

Just before he left the nursery school, J. E. was given the Merrill-Palmer test again at the age of 5 years 2 months. He made a score of 81 points, giving him a mental age of 5 years 6 months and a percentile rank of 57. On the Stanford Binet test he had a mental age of 5 years 4 months and an IQ of 103.

After leaving the nursery school, J. E. was given the Stanford Binet test once more at the age of 6 years 1 month. At that time he had a mental age of 6 years 8 months, an IQ of 110.

During his school career J. E. had progressed 20 points in his IQ on the Stanford Binet test and from the 10 to the 57 percentile on the Merrill-Palmer scale. While he was never outstanding, the improvement in his mental rating during this time was probably due in large measure to the fact that

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the school environment supplied the stimuli the home environment lacked and enabled him to make up for his inadequate home background.

### FOREIGN-LANGUAGE HANDICAP

In any mental test involving the use of English in the response or the comprehension of English when the test is presented, it is customary to allow for the language handicap of the subject whose family uses some other language in the home. However, though no separate norms have been worked out for non-English-speaking children taking the Merrill-Palmer test, the results seem to indicate that this test requires less allowance for a foreign-language handicap than do most others. The type of response required in many of the test items is almost self-evident, and others can be explained readily by pantomime. Further, the language tests themselves can be omitted and allowed for on the basis of the child's performance in the other test elements, though the omission of the language tests in such instances seldom makes a difference of more than two or three months in mental age.

The two following case studies indicate the usefulness of the test in examining children from non-English-speaking homes.

*T. P.: girl, age 2 years 10 months at time of first examination.* The parents of T. P. were cultured Russian people with fine standards and an unusual educational background. They had fled from Russia after several members of the family had been killed by the Bolsheviks. They knew little English and spoke Russian almost exclusively in their home. T. P. was the only daughter of this young couple, who were having something of a struggle to survive in the economic maelstrom of Detroit. They were eager to learn American ways and to adjust themselves to American life.

T. P. was entered in the Merrill-Palmer nursery school at about the time of her first mental test. She knew practically no English. It was impossible to give her the Stanford Binet test at this time because of her language handicap. She was given the Merrill-Palmer test, with the Action Agent and Repetition of Word Groups tests omitted. Her total score was 38 points, giving her a mental age of 2 years 11 months and a percentile rank of 66. The language handicap probably obtained to some extent in certain of the tests given, but many of them could be explained by pantomime. T. P. was neat and careful, holding a high standard of performance for herself. She was happy when successful and nearly cried when she failed. She responded well to praise, was very curious, and chattered volubly in Russian.

After six months in the nursery school T. P. was given the Stanford Binet test at the age of 3 years 3 months. She made a mental-age score of 2 years 8 months, an IQ of 83. She learned English rapidly through her association with the nursery school children.

When she had been in the nursery school one year and was 3 years 10 months old, T. P. was given the Stanford Binet test again. Her mental-age score at this time was 4 years 2 months; her IQ, 109. One month later she was given the Merrill-Palmer test a second time and made a score of 75 points, giving her a mental age of 4 years 10 months and a percentile rank of 93. She was now able to answer 8 of the 10 questions and could repeat the word groups, but she failed to get the idea of the Action Agent Test. She was very able in tests that did not involve the language factor. She was greatly interested and again talked volubly, this time in English. She used short sentences, but spoke distinctly and clearly. It seemed clear that the child had greater ability than the results of the first tests indicated, for her scores increased measurably after she had overcome her



language handicap to some degree. The great difference in the scores she made on the Merrill-Palmer and Stanford Binet tests is probably to be attributed to the relative use of the language factor in the two tests.

T. P. has not been tested further.

*T. O.: boy, age 6 years 2 months.* T. O. was cross-eyed and rather thin and miserable looking. He had been ill-treated by his parents, who were foreign-born. Both were working, and the child stayed at a day nursery after school hours. A mental examination of the child was requested by the matron of the nursery, who said that his behavior led her to think him somewhat retarded mentally but that she had been unable to have a mental test made because he could not speak enough English to take a Binet test.

T. O. was ready to work with the test materials and seemed interested. He did not understand English well enough to respond correctly to any of the Action Agent questions, and his failure with the Decroly Matching Game seemed to be due to his language handicap. These tests were accordingly scored as if they had been omitted. T. O. was a slow-moving child, and his time scores were more typical of a 4-year-old than of a 6-year-old. His total score — with the omission of the language tests — was 69 points, which gave him a mental age of 4 years 5 months. Even allowing for his language handicap, poor home environment, and inadequate physical care, T. O. could not be rated as other than inferior mentally.

## CHAPTER SIXTEEN

### INSTANCES IN WHICH DIAGNOSIS OF THE CHILD'S MENTAL LEVEL IS NECESSARY IN PLANNING FOR HIS FUTURE

IN working with children, many cases arise in which it is very difficult to plan for the child's future without an adequate knowledge of his mental level and some idea of his possibilities for mental development. The following case studies present situations typical of those in which the mental diagnosis is important.

#### DIAGNOSIS FOR ADOPTABILITY

Child-placing agencies have long recognized the disappointment often engendered by placing children in adoptive homes without a diagnosis of their mental level. They have long realized the importance of placing bright children in superior homes where the parents are of approximately equivalent mental level, and of placing average children in average homes where the expectation of achievement will not be greater than the child can attain. Children of a mental level below the average are as a rule better off in boarding homes or, if of very low-grade intelligence, in institutions, where their inadequacy will produce less emotional dissatisfaction than it would in a private home.

Other factors than the actual mental level should of course be considered in determining the adoptability of a child. Some children are temperamentally so placid and so emotionally stable as to fit well into any normal home situation. Other children require a special type of environment to bring out the best development and achievement of which they are capable. In making a report to the placing agency, the examiner should bear in mind that any light he can throw on the child's personality will be of great assistance to the agency and may prevent an unsuitable placement. In the

following cases an analysis of this kind, accompanying the report on the mental test, proved very helpful.

*R. N.: girl, age — as accurately as could be ascertained — 2 years 5 months at time of first examination.* The child was a foundling. There was no trace of her parents or her early history. While the child seemed normal, prospective foster parents were unwilling to take her without some knowledge of her parentage. At length prospective foster parents appeared who were interested in the child and were willing to take her if the mental-test report was favorable.

The first examination was made two months after the child had been placed in the foster home. She came to the examining room with an unusual degree of spontaneity and enthusiasm and maintained her eagerness throughout the examination. She talked volubly and made interesting comments. She attacked the test materials with energy, and her manner was one of assured self-confidence. Her movements were precise and even meticulous, but she tended to distractibility and flightiness of effort. She appeared to be of a happy, extrovertive disposition, with no reticence toward strangers, and capable of making quick, easy adjustments to new situations. She manifested a lively curiosity about everything in the examining room but desisted from handling objects if she was requested to do so. No undesirable personality traits were in evidence during the examination.

R. N. awaited the opening of each box of material with eagerness and could scarcely refrain from reaching for it before the directions were given. Her score on the Merrill-Palmer test was 22 points, giving her a mental age of 2 years 5 months. It was believed safe to predict that the child was a satisfactory risk for adoption if the chronological age of 2 years 5 months was correct. The foster mother was asked to return the child to the Consultation Center if any serious

personality difficulties appeared, and in any case to bring her back for a second test before the final adoption papers were made out.

The child was placed in an excellent home. The parents were college graduates, in their thirties. They had previously adopted a boy, and R. N. was chosen to be his companion and sister. The boy was related to his foster parents and had been with them for some time. The little girl seemed to adjust herself happily in her new home, and favorable reports concerning the placement were received from time to time.

One year later, at the age of 3 years 6 months, R. N. was returned for a second examination. She no longer presented a picture of charming spontaneity. She was rather shy at first, though this shyness wore off as the examination proceeded. It was only after much urging that she was persuaded to attempt the first test. Gradually her shyness was replaced by a desire to be the center of the stage, and when the examiner failed to praise her she tended to become distracted and to forget her task. She was careful and exact in all her movements, but though her interest and alertness increased as the examination proceeded, at no time was she curious or interested to know what the next game would be. She did not talk very distinctly and often lapsed into baby talk; several times during the examination she stuttered a little.

On the Merrill-Palmer test R. N. made a total score of 61 points, giving her a mental age of 3 years 11 months and a percentile rank of 78. She showed good motor coordination. Her perceptive ability was poorly developed, and her visual discrimination of form was below average. Slow, careful movements predominated in her performance. She showed rapid learning ability and partly compensated for her slowness of response by a high degree of accuracy. Her language

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development was inferior to her general level of development and below the average for a child of her age.

On the Stanford Binet test R. N. made a mental-age score of 3 years 4 months, an IQ of 95. She passed all the 3-year tests and failed all the 5-year tests.

The examiner thought that much of the change in the child was to be attributed to the attitude toward her in the foster home. She was in the home on trial and had developed a justifiable feeling of insecurity. There had also been a tendency to place her at the center of the stage and to talk about her in her presence. A talk with the foster parents revealed that though they considered her a desirable child and were very fond of her, they had allowed the question of her heredity to influence their judgment of her behavior. Behavior fairly characteristic of children of her age was interpreted as cunning and sly, as when she pretended to be asleep at nap-time and when she made unwarranted bids for attention when guests were present.

It was clear that the child had attempted to adjust to the feeling of insecurity and to her foster parents' criticism of her and their unfavorable comparison of her with the older boy, whose heredity was known and approved, by attempting to be the center of attention. She had developed a certain vanity about her personal appearance, asking for beads, a powder compact, and other beauty accessories of the older girl. In an effort to curb these undesirable responses, the foster parents had denied her requests. As a result she had recently taken a compact from a visitor's purse and on several other occasions had been too acquisitive. All these traits the foster parents attributed to her heredity.

It seemed quite probable that the child's desire for personal ornamentation was part of a general desire for attention. The foster parents were given a number of suggestions about

training the child and about what had happened to her in her attempt to adjust herself to their home life. They were intelligent and on the whole wise and well-balanced and quite capable of caring for children properly.

*E. S. : girl, age 2 years 6 months at time of first examination.*  
E. S. was the child of parents born in Hungary. The mother had died at the birth of the child, which was premature. The father became despondent after the death of his wife, began to drink heavily, and finally gave up the child for adoption. The families of both these young parents were self-supporting and apparently of fair intelligence. The child was placed in a good home for adoption. Before the final papers were made out, it was decided that the child should have a mental test, since she seemed to be developing rather slowly. The child whimpered when she was taken from her foster mother to go to the examining room, and the foster mother was therefore asked to come with her. The child's responses betrayed a nervous instability. She investigated the test material casually and then rejected it immediately, leaving the table to run about the room. She executed a few very simple commands, such as, "Bring me the ball," and, "Shut the door." She indicated toilet needs by a peculiar noise; her foster mother said she had been trained for the toilet easily. She had not begun to creep until she was 22 months of age and did not yet walk steadily at the time of the examination.

On the Kuhlmann-Binet series E. S. made a mental-age score of 14.4 months, with an IQ of 48. She was unable to do any of the tests of the Merrill-Palmer scale. She removed the pegs from the peg boards but then was unable to replace them.

The prognostic report sent to the child-placing agency was as follows :

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E. S. is a decidedly retarded child, both mentally and physically. In addition, she indicates a degree of nervous instability which is decidedly unfavorable. It is not likely that she will progress very far mentally. She is by no means a suitable child for adoption. Unless her mental level is raised considerably during the next year, institutional care will probably be the best solution.

The foster parents were fond of the child and did not wish to part with her. Finally, however, at the age of 3, the child was taken from her foster home and placed in a boarding home. The boarding mother complained that she had poor toilet habits, that she did not know how to chew her food but swallowed it whole, that she did not talk, and that she went from one thing to another in a very flighty manner. She was attractive and appealing, however, and so the boarding mother made an effort to train her and to overcome her bad habits. After four months the boarding mother decided that her efforts with the child were in vain. The child had not yet learned to talk, was developing screaming spells, and was becoming very destructive, pulling clothing out of drawers and destroying everything within reach. E. S. was removed from this home and was soon afterward brought to the clinic for a second examination.

The second examination was made when the child was 3 years 6 months old. She began to whimper and cry when the examiner approached her in an attempt to interest her in the games, and then she screamed and had a temper tantrum. It was only after considerable difficulty that the child was persuaded to accompany the examiner to the testing room. She did not coöperate satisfactorily at any time.

On the Gesell series E. S.'s level of performance was about 18 months, and she was barely able to achieve this level. She was decidedly negative in the test situation and refused to attempt many of the tasks. Those she performed most satisfactorily were chiefly concerned with body locomotion.

Her response to pictures was like that of a normal child of 18 months, and she showed an imitative response of the same level.

On the Merrill-Palmer series she showed no understanding of the tests usually done by children between the ages of 18 and 23 months. Her only interest was in shaking the test material and making a noise with it.

On the basis of the results of this second examination institutional care was recommended as the best solution of the problem of placing the child.

*S. K. : girl, age 2 years 11 months.* The child's parents were Polish. The father was incapable of supporting the family. He was cruel and constantly mistreated his wife and family. He had served several jail terms for disturbing the peace. The mother had attempted suicide but had failed. She was found to be suffering from general paresis and was committed to a hospital for the insane.

The four children became public charges. The three older children had been examined as to adoptability, and their physical and mental condition indicated that they were probably good risks for adoption in spite of their bad heredity.

S. K. had been placed in an out-of-town home with moderately well-to-do, middle-aged foster parents. They were a refined and rather alert couple who were devoted to the child though she had been with them only four weeks. At first S. K. had given them some trouble with tantrums, but she had shown rapid improvement. Her disarming smile and charm appealed to them so much that they realized they were in grave danger of spoiling her.

S. K. was tiny, a little pale, and blue under the eyes. She was somewhat alarmed at being removed to the examining room, and cried. She was soon distracted from her weeping by the test materials and set out to achieve a test record which was both unusual and startling to the examiner, who



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was used to a quite different performance from children who have become juvenile court charges. She had unusually good language development, talking in long sentences with little accent or baby talk. She was neat, careful, and exact in handling the test materials. She did the Little Pink Tower in 9 seconds and the Mare and Foal Test in 71 seconds. She put the Nest of Cubes together in 5 seconds. On the Merrill-Palmer test she made a total score of 66 points, giving her a mental age of 4 years 2 months; the score has a standard-deviation value of  $+2.5\sigma$ .

Because of her unusual performance on the Merrill-Palmer test it was decided to give S. K. the Stanford Binet test. She made an even more striking score on this test, with a mental age of 4 years 8 months and an IQ of 160. When asked whether she was a little girl or a little boy, she said, "A little girl. Can't you see I got my best dress on?" Her definitions were given in the following positive manner: "A doll is for to play with, gosh sakes." "A pencil is for to write with, gosh sakes." "A table is for to eat on, gosh sakes."

The foster parents, when told that she was a very promising child from the point of view of mental development, said that, though they had no standards of comparison, they had suspected as much; she was too clever at getting what she wanted to be very dull. They acknowledged that they had a very real responsibility in giving her an adequate opportunity for development, and they seemed to realize that their greatest difficulty lay in the direction of her character development. Since she was determined to get what she wanted at all costs, it appeared to be their job to direct her development so that she would want the right things.

The foster parents were urged to bring the child in for a retest after one year, but since they live out of town, they have never done so; there is accordingly no record of her development since the mental test.

THE MENTAL DIAGNOSIS AS AN AID TO CLINICS IN  
THE SELECTION OF CHILDREN FOR TREATMENT

An orthopedic clinic in Detroit was overwhelmed with cases for corrective work. Each case required so much time and effort that it was impossible to treat all the cases entered. It was decided, therefore, that the attention of the clinic should be centered on those children who would profit most by the treatment; that is, children of normal mentality from coöperative homes. The following cases are representative of those examined for the clinic.

*F. R. : girl, age 2 years 1 month.* The mother was a cheerful, friendly Italian woman who spoke little English. The child was suffering from congenital flat-foot. She was wearing braces and was unable to walk.

F. R. made a score of 15 points on the Merrill-Palmer test, giving her a mental age of 2 years 1 month, which was identical with her chronological age. She showed good ability throughout the test. She built a tower six blocks high and put all sixteen of the cubes into the box, though she took a long time to do it and asked her mother to do it for her. She seemed very dependent upon her mother. She was able to match the red and green colored disks, but failed to match the blue and yellow ones. She put the Nest of Cubes together in 240 seconds. She found throwing the ball a thrilling play, and cried out excitedly, "Catcha, catcha." While she found Peg Board A fairly easy, she had great difficulty with Peg Board B. When she succeeded in putting in all the pegs in 255 seconds, she was pleased with her success but refused to try again. She was greatly pleased with the scissors and paper, and worked at the task logically and persistently. When she succeeded in cutting one gash in the paper, she smiled happily and then continued to work until she was able to manipulate the scissors sufficiently well to cut several more gashes.

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F. R.'s language development was good for her age. She chattered in Italian and in English. When she heard the huckster's horn outdoors, she looked up with animation and said, "Fresh fish." The mother, who considered her a bright child, said that at the age of 6 months she had said a few words, such as "Pa," "Ma," and "drink," and compared her development in this respect with that of her other children, who she believed were not so bright as F. R. The younger child, 8 months old, she said, "No talk nothing."

F. R. was afraid of having her clothing touched, probably as the result of association with painful experiences at the physician's office. She was also afraid of cats.

In spite of the handicaps of a foreign language and the inability to walk, F. R. made an average score on the Merrill-Palmer test. There was no evidence of serious behavior difficulties. The mother seemed to be fairly intelligent in managing the child, and though she understood little English, was quick to grasp ideas, and it was thought would cooperate satisfactorily with the clinic so far as she understood what was wanted. The child was therefore recommended as one for whom the correction of physical defects would be well worth while.

*E. K.: boy, age 4 years 5 months.* E. K. was hydrocephalic and could not walk. Examination was asked to aid in determining whether it was worth while to spend much time in teaching him to walk.

E. K. had a mental age of 3 years 4 months and an IQ of 75 on the Stanford Binet test. On the Merrill-Palmer test, which has more tests requiring motor skill, he rated even lower, with a mental age of 2 years 7 months. If the child had not had hydrocephaly, with its accompaniments, he would have been attractive. He had a clear skin, dark brown eyes, good features, and well-shaped hands and nails. His mother carried him to the examining room, where he was

able to sit upright in a chair without assistance, though his knees were stiff.

Testing E. K. was difficult, for he was both distractible and excitable, screaming with joy at the sight of new equipment and refusing to attend when he was no longer interested. He was very impatient and reached for everything in sight, so that the table had to be kept clear of everything but the material in immediate use. It was evident that he understood nearly everything said to him but ignored anything that did not appeal to him. When pressed for a response, he postponed the matter with the remark, "I can't tell you right this minute." He was willful, and the demands he made upon his mother suggested that she had been indulgent to an extent unwarranted by his physical handicaps.

E. K.'s use of language and response to verbal stimuli were superior to any other phase of his development. Throughout the examination he spoke spontaneously in sentences: "I'm playing this game. This is a big choo-choo that's going up to Ypsilanti." He had queer lapses in which he said, without any apparent reason, "Excuse me." At the beginning of the examination his mother said, "Pay attention to the lady," and after several minutes he said, "I pay 'tention to the lady." In the Stanford Binet series he passed but two tests beyond the basal year three, and both of these were in year four. A test was secured by removing everything from his reach and vision, and persisting until a response was given. He seemed to memorize verbal material with ease and was persuaded to recite "Little Jack Horner," which he did creditably. He often asked for a deck of cards, with which his mother said he played happily for hours.

It was difficult to hold E. K.'s attention to tasks as objective in nature as the peg boards or the pyramids. He used gentle, non-vigorous methods in working with the material. He was markedly disturbed by any abrupt elements in the

testing environment, and a calm, quiet presentation of the tests proved to be the only method to use with him. He was startled by noises; the noise of dumping the Seguin Form Board blocks on the table, which usually has so much appeal for the preschool child, caused real fright. He was easily distracted and lapsed at times into fits of dreamy abstraction. Occasionally he showed ability much superior to his general level of performance, but did not maintain it long enough to complete a single test.

While it was apparent that E. K. was decidedly retarded in development, an attempt to teach him to walk did not seem hopeless. Since it was possible that his mental ability might be modified if his physical condition was changed, it did not seem wise to predict his probable limit of development. It was recommended, however, that, if a choice were to be made of the most promising children for orthopedic treatment, E. K. was one to be eliminated.

## CHAPTER SEVENTEEN

### CHILDREN WITH SPECIAL DIFFICULTIES

#### CHILDREN WHO DO NOT TALK

PROBABLY every clinic dealing with young children has had children brought to it who fail to talk long after they have reached the usual age for acquiring this attainment. The mental test requiring a language response is of course useless in such a situation, though it is usually necessary to get a fairly accurate idea of the child's mental level in attempting to make a diagnosis of the reason for the inability to talk.

The first thing to do in such a case is to determine whether the child's hearing is normal. This may be done easily with the Merrill-Palmer test. If the child responds to verbal directions, varying in pitch and intensity, it is probable that his hearing is unaffected; if he fails to do so, he is probably either deaf or feeble-minded. The use of pantomime instructions and demonstrations of the first trials in such tests as the Seguin Form Board and the peg boards will usually determine whether the child is deaf or mentally inferior. The deaf child of normal intelligence readily interprets pantomime directions.

The following cases illustrate various types of children who have shown delayed response in talking.

*S. M. : boy, age 3 years 7 months.* A child-placing agency brought S. M., an illegitimate child, to the clinic for assistance in working out a plan for his future. Though at the age of 18 months he had been pronounced by a psychiatrist "normal mentally and probably suitable for adoption," he had impressed the social workers as queer and possibly sub-normal. Many factors contributed to this impression. He was a bed-wetter and had never been successfully trained for the toilet. He was easily frightened, and quivered and

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jerked when he wept, indicating extreme fear, often without apparent cause. Though he was well over 3, he did not talk. There was no history of disease or feeble-mindedness on either side of the family, and the relatives were summed up as "a good, industrious family."

S. M. was a pale, thin-faced child. He had light brown hair and brown eyes which were slightly Mongoloid in type, with a slight lift at the outer corners. At first approach S. M. gave the impression of a passively coöperative child who had many repressions. He came willingly to the examining room, but seemed serious and shy. He soon began to respond, however, and laughed gaily at times and became much interested, working eagerly at the tasks presented.

In language development S. M. was strikingly inferior to other children of his age. He said little, and most of his efforts to talk were unintelligible. "No-no-da" was a favorite expression. He said once, "I make pie." He repeated the stimulus words of the Action Agent Test, though indistinctly. However, he seemed readily to understand what was said to him and was able to follow verbal directions as well as the average child of his age. Owing to his inability to use language, the tests involving language response could not be rated; S. M. sat sucking his thumb when an attempt was made to get a response to these tests.

It was much easier to get an idea of his mental ability from his response to the non-language tests. He was fairly persistent in his performance on these tests, making a score giving him a mental age of 3 years 3 months on the Merrill-Palmer series when the language tests were scored as failed, and a mental age of 3 years 4 months when they were scored as omitted. He was somewhat irritated by failure and worked best when he was given a good amount of approval and encouragement. He had a coarse tremor and very poor motor coördination.

Though S. M.'s score on the Merrill-Palmer scale was slightly below average, he did not appear to be feeble-minded. It is possible that his speech disability may have affected the score further than was apparent. He seemed, however, to understand language and the uses of objects very well. Several instances in his social case history of imaginative play of rather high level lent substantiation to the test findings; namely, that his general understanding and mental level were average.

In the face of these test results, however, S. M. produced the impression of a child with a strange personality. At times his expression was so blank that he seemed to be entirely unaware of what was happening about him; he seemed completely abstracted and failed to respond when addressed. At other times he behaved like a normal, healthy, and somewhat playful child.

His behavior, together with his history, led the examiner to think that he might be the victim of some serious emotional conflict and that such a conflict might be related to his difficulty in learning to talk. His life had been so far from the normal one of a little child that an emotional disturbance of some sort did not seem improbable. At this time, at the age of 3 years 7 months, he had had six different home environments and many visits to hospitals and clinics, and there was considerable evidence that his experiences at hospitals and clinics had frightened him. After some of these experiences, his history showed, he had behaved like a child suffering from a fear neurosis. Though he seemed so strange and repressed and abnormal with strangers, his history showed that each time he had been left in a boarding home long enough to adapt himself to the home life he had endeared himself to the family members, and that his type of response improved rapidly after he had adjusted himself to his home life.



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It was recommended that the child be given as normal and happy a family life as possible, that he be relieved from fear of any sort, and especially that if physical examinations were found necessary they should be so conducted as to prevent frightening him. The examiner hesitated to recommend him unreservedly for adoption, but believed that he was quite possibly a child who could be rescued from himself by happiness and affection. His habit of retiring within himself and appearing entirely insensible to a new and strange environment seemed to be a defense reaction.

*J. M. : boy, age 6 years 3 months.* J. M. had been sent to a school for the feeble-minded one month before he was examined. No mental test had been given him; he had been sent to the institution as a last resort after a physician had given a diagnosis of feeble-mindedness. He came from a somewhat superior home. His parents, who were of moderate means, had done everything they could for the child. He had been an attractive infant and had begun to talk in a satisfactory manner when his parents began to notice a gradual change. The child became restless, no longer attempted to talk, and became an increasing trial and care to them. Several minor accidents and narrow escapes indicated that he must be watched constantly. He was difficult to teach and altogether puzzling to his bewildered parents. Local physicians were consulted but offered no help except to advise institutional care. At the age of 6 he had not yet learned to talk. At last, in despair, they had taken the advice of their physician and sent him to a school for defective children.

J. M. was wandering about the cottage playroom of the school in a most disconsolate fashion when the examiner came to take him to the examining room. Plump, handsome, large for his age, well dressed, and cleanly in appearance, J. M. was strikingly different from the other children

in the playroom. He had a worried, bewildered expression. He did not resist being led to the examining room but seemed to be in a daze.

Since J. M. could not talk, no attempt was made to give him the tests involving a verbal response. When the materials were presented to him, it was clear that he did not understand spoken directions. He seemed to be deaf, though when there were slight, unusual sounds, he would turn around and investigate in a way which indicated that he heard noises. He was interested in the test materials, and the examiner soon discovered that he could be given some idea of what was expected if the directions were given in pantomime. He completed the Seguin Form Board Test in 42 seconds, the Mare and Foal Test in 71 seconds; and he fastened the two- and four-button strips in 21 and 32 seconds respectively. He built the Little Pink Tower in 15 seconds. He did not understand what was expected when presented with the picture puzzles until Puzzle No. 2 was put together; after seeing this done, he completed Puzzle No. 3 in 27 seconds.

While the number of omitted tests was necessarily large, a sufficient number of tests could be scored to give an approximate rating of 78 points, giving him a mental age of 5 years 1 month. Obviously, the child could not be classed as feeble-minded. His difficulty was possibly an aphasia. As a result of the test a special neurological examination was advised, and it was recommended that the child be given a special corrective training, of a type impossible to give in the crowded school for defectives, and that it would be better to place him in a school for the deaf than in an institution for the feeble-minded.

*B. W. : boy, age 4 years 9 months at time of first examination.*  
B. W. was referred for examination by a pediatrician who had given him a thorough physical examination. The child had been diagnosed as partially deaf, and though the pedi-

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atrician was almost convinced that this was a correct diagnosis, he had decided to send him for a mental examination before making further plans for the child.

B. W. was the oldest child in a superior, well-to-do family. His parents were greatly worried over his condition and were making every effort to get at the cause of their son's difficulty and to make proper plans to insure satisfactory development.

He had had croup at the age of one year. His left testis was undescended and the right only partially descended. He was a pronounced mouth breather, and he banged his head habitually. He had masturbated since the age of 2½ years. His vocabulary numbered only a few words, which he made no attempt to put together.

The child came to the examining room with great reluctance and had to be carried part of the way. However, when seated at the table with his own favored ball in his arms, he investigated the tests and soon became calm and interested. He was quiet throughout the examination and at the end was able to amuse himself quietly for some time while the examiner talked with his mother. He was unable to understand any verbal directions, and the results of all tests which could not be explained by pantomime had to be omitted. The Little Pink Tower was presented to him first. He grasped the idea of what was wanted, and responded by smiling and saying, "Block," as he built the tower in 11 seconds, an average time for a child of his age. He did not always grasp the idea of a test so quickly. He did not understand what was wanted when the pyramids were presented, and his usual response to blocks was to build a tower. He could not understand from the pantomime what the examiner wished him to do with the picture puzzles, and he failed all three of them. However, it was possible to get a satisfactory rating on a number of tests.

He showed a decided preference for the use of his right hand

in manipulating objects, though he used his left hand without apparent difficulty. His general motor control was good, and he performed feats with the test material which were on a par with those of the average child of his age. At no time did he appear hurried or show any desire to be through with one test in order to see another. Several times he picked up a block or a picture and held it out before him and examined it slowly, with a dreamy look, a rather unusual method of investigation in a child of his age. He sometimes twisted his head in a peculiar manner and closed his eyes, with a frown. Once or twice he put his head on the table, resting it on his left arm, without interrupting his work. This response was observed also in the playroom where he waited for the examiner. While playing with the ball, he lay down on the floor and rested his head on his left arm; when his mother made him get up and lie on the couch, he did not seem to understand what was wanted, and each time he was left alone resumed the same position on the floor. His mother finally spanked him for this performance.

B. W. failed to grasp any verbal directions during the test. The examiner tried talking in a loud tone, very slowly and distinctly, but this did not produce a response. The child did not seem to understand what the examiner was saying. The only two words he said during the test were "ball" and "block." At times he sang a jargon of his own in a monotone; he interrupted his work to listen to himself at these times. Speaking to the child from across the room was ineffective unless the comments were very brief. He responded best to, "Look here, B." At intervals, while the child sat quietly at the table with the materials, the examiner said, "Look here, B.," while standing at a distance of at least ten feet from the child, using varying pitches and degrees of intensity of voice, each time taking care to show some new object of interest to the child in order to maintain the incen-

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tive for a response. B. W. did not respond well to unusual tones of voice or to the unfamiliar voice of another person watching the performance, but he did turn whenever the examiner spoke to him in a natural tone of voice, no matter how low she spoke. Even when she only whispered loudly, B. W. turned around. This test, in which there was no stimulus besides the one of sound, made it so obvious that B. W. responded to sound that the diagnosis of deafness, at least of deafness to certain voices, was eliminated.

B. W. masturbated frequently during the examination; the desire to masturbate seemed to come in the midst of some game in which he was interested. His response seemed to be a reaction to an irritation he could not forget. He also picked his nose frequently, and his nails were badly bitten.

The child was sensitive to the examiner's presence, and though he played quietly by himself he seemed to understand that certain tasks were to be done for the approval of the examiner. He had just started buttoning the four-button strip when there was a tap at the door and the examiner went to answer it; while she was at the door he stopped working and waited patiently until the examiner was reseated before beginning again.

The result of the examination was a score of 63 points, giving B. W. a mental age of 4 years 1 month. Since he was 4 years 9 months old, this gave him a percentile rank of 16; the score had a standard-deviation value of  $-0.5\sigma$ . His difficulty did not appear to be one of general mental deficiency, but rather some special disability interfering with the acquisition of language.

It was recommended that, in addition to a carefully planned program of home life, he should be given special instruction in the home. His parents secured the services of an intelligent kindergarten teacher, who was carefully instructed in methods of dealing with the case and who

taught B. W. for a daily interval over a two-year period. At the end of that time, when he was 6 years 9 months of age, he was brought back to the clinic from an up-state city where the family was living. At that time he could do many things; he could write some words and recognize more words, and could do simple problems in addition. On the whole, however, he had changed for the worse. His actions were uncontrolled, and he showed quick changes in behavior. He wanted new things continually and tried to get them by means of tantrums if he could not get them otherwise. He gave up tasks easily and was extremely peevish at times. It was difficult to test him because of his refusal to coöperate. He could not be given the Stanford Binet test; he was unable to answer any of the language questions but mumbled a repetition of what was said to him. The tests he did respond to in this series were naming colors, counting thirteen pennies, and giving his name. The results of the examination, both in performance and verbal material, were very meager; it was clear, however, that he was able to repeat short statements made in an ordinary tone of voice, but was unable, on the whole, to make any verbal response other than repetition. In many ways the child seemed not to have developed greatly since his examination two years before. Some of his reactions suggested a general mental deficiency; others indicated that the child had some special disability.

The pediatrician's report did not indicate any outstanding physical trouble. He did not think the symptoms suggestive of a brain tumor or abscess, though he considered it possible that the child might have had encephalitis in early childhood.

At this time it was decided to send the child to a specialist in an Eastern city, who had been unusually successful with children having special disabilities. This specialist reported that the child had a type of pituitary disturbance. The child was placed in a special school, under treatment, and

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made such strides during the next year that the specialist reported: "The more I see of him, the more I think he has a chance of a completely normal adult life."

*A. H. : girl, age 4 years 4 months.* This child, who had no brothers or sisters, was placed in a nursery school by her mother, who was a widow. The child was excessively shy and needed the companionship of other children. On the whole, she had been well; her disease history showed only occasional tonsillitis. She had walked at 14 months of age and talked soon after she was a year old. She had a good appetite, though she was inclined to eat very slowly. The mother reported that the child was much afraid of the dark and had night terrors.

It appeared that something unusual had affected the child at the time of her entrance to the nursery school at 3 years 7 months of age. Perhaps she had been urged too much to enter in with the group or to express herself; at any rate, the tendency to withdraw from active participation in the school activities was marked. From the day she entered the nursery school she had refused to speak to either the children or the teacher. At first she sat alone in the swing most of the time; but whenever she freed herself from this repressive attitude, she showed signs of being an interesting child with some ability. Her mother was distinctly worried about her. Though the child continued to talk at home, she did so less and less. In spite of the efforts of both the mother and the nursery school teacher only occasionally did some word slip out at school, and she never used sentences.

The nursery school teacher finally brought the child to the psychologist for examination. The child was taken to the examining room alone. No effort was made at first to get her to talk. The examiner gave her some of the Merrill-Palmer test material, which elicited her interest and coöperation from the start. Care was taken to make no demands upon

her for language expression during the first part of the examination, but to draw the child's attention slowly and cautiously from herself. Soon she was talking freely over the games and had forgotten her habit of vocal repression. The Action Agent Test was then administered without difficulty, and after that the Stanford Binet tests were worked in with the Merrill-Palmer tests. It was possible to get a complete performance on both. The Merrill-Palmer score was 70, giving her a mental age of 4 years 6 months and a percentile rank of 63. On the Stanford Binet series she had a mental-age score of 5 years 7 months and an IQ of 129.

In order to break down the child's resistance to speaking, the examiner brought out her most interesting auxiliary play materials and kept the child talking and playing happily. Finally it was suggested that the nursery school teacher might like to see these attractive toys. When the teacher was brought into the room, A. H. continued working unconcernedly and talked freely to both the examiner and the nursery school teacher, much to the amazement of the latter.

When A. H. left the examining room, she was still in the mood to talk freely. The nursery school teacher afterward reported that it was no longer so difficult as it had been to get the child to talk in school. Though she was far from loquacious, she was willing to reply to questions and occasionally made a spontaneous remark. She seemed very shy when speaking and held her head down, speaking very softly. The nursery school teacher tried not to force her in any way to speak, but to make it seem natural and easy to do so. Under this method a continuous improvement in the child's response was reported.

#### DEAF CHILDREN

The deaf child presents a difficult task to the mental examiner. A deaf child is handicapped not only by his



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inability to hear directions, but usually also by the effects of a cumulative lack of opportunity for development in daily life. Frequently he presents serious personality distortions, even by the time he is 5 years old. The average person finds himself ill at ease in his efforts to communicate with a deaf person; this feeling and attitude quickly carry over to the deaf child and increase his natural feeling of separation and difference.

Thus it is difficult to determine the mental level of the deaf child, who is withdrawn from reality and lacking in means of communication. Many persons assume that the deaf child is of inferior mentality; whereas the proportion of inferior mentality is not necessarily greater among the deaf than among the hearing population.

By omitting from the Merrill-Palmer series those tests which cannot be explained by pantomime, mental tests of young deaf children have been made. Brief summaries of the results of testing seven such children at the Detroit School for the Deaf are given below.

Seven deaf girls, all in the same grade at the School for the Deaf, show the following variability in mental development: One child stands out as above average in mental ability, and one as below average; the remaining five have mental ages only a few months removed from their chronological ages, with a scattering of ability between the extremes of the other two.

*A. S. : girl, age 5 years 8 months.* A. S. quickly grasped ideas given to her in pantomime, though she could do little lip-reading. The only test scored as omitted was the Action Agent Test. She did the Seguin Form Board in 35 seconds, with no errors, and the Mare and Foal Test in 43 seconds. The three picture puzzles were quickly completed, and it was unnecessary to demonstrate the first puzzle. She made a score of five points on the Manikin Test and placed 15 of the pictures of the Decroly Matching Game in 162 seconds.

She was businesslike and very neat in her performance. She made a score of 86 points, giving her a mental age of 6 years 2 months. The child could thus be classified as average or slightly superior in mental development.

*B. R. : girl, age 5 years 0 months.* This child seemed to understand the pantomime of the examiner fairly well. She failed the Little Pink Tower, though she did build it. She failed the second and third picture puzzles, though she succeeded in doing the first one. She was slow of movement and rather clumsy. She did not grasp the idea of the Decroly Matching Game and placed only two pieces correctly. These were probably chance placements, since she seemed to place the pieces indiscriminately; some were upside down. She made a score of 59 points, giving her a mental age of 3 years 10 months. Counting the Decroly Matching Game as omitted, because of the language elements involved, brought the score up to 60, with a mental age of 3 years 11 months. This score places the child in the slightly below average group, as compared with normal children.

*M. W. : girl, age 5 years 6 months.* M. W. was very attractive and coöperative. She "caught on" quickly, though it was necessary to demonstrate the first picture puzzle before she understood what was wanted in that series. Her care in placing the blocks of the Little Pink Tower lowered her time score. When the ball placement was demonstrated in the Decroly Matching Game, she grasped the idea at once. She drew three neat and accurately made stars. The Manikin was put together correctly but not tightly enough to merit 5 points. The total score was 80 points, giving her a mental age of 5 years 3 months.

*L. J. : girl, age 5 years 1 month.* This child made no errors in any test presented, and she would have made the maximum number of points possible if she had been slightly quicker. She required no demonstration in the Decroly Matching

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Game and placed all 16 cards correctly in 179 seconds. Her total score on the Merrill-Palmer scale was 88 points, giving her a mental age of 6 years 4 months. The test was obviously too easy for a child of her ability and did not adequately show the range of her skill. L. J. was an unusually graceful child and responded exceptionally well in the school rhythm work. Though she could not hear, she had already learned to keep time to music in a simple dance step.

*L. N. : girl, age 5 years 4 months.* L. N. proved to be a very slow and deliberate child and was accurate and careful in her work. She made few errors and comprehended the pantomime directions easily. Her total score was 79 points, giving her a mental age of 5 years 2 months.

*F. G. : girl, age 5 years 0 months.* F. G. was somewhat slow. She found copying the star difficult and failed all three attempts. She required a demonstration of the first picture puzzle but was able to do the other two. She took 205 seconds to do the Mare and Foal Test; on the other hand, she placed all 16 of the cards of the Decroly Matching Game correctly in 131 seconds. Her total score was 81 points, giving her a mental age of 5 years 6 months.

*V. C. : girl, age 5 years 1 month.* This child was capable and coöperative and made few errors. She needed no demonstrations. Her performance was surprisingly like F. G.'s, except that she made a 2-point score on the Manikin Test, instead of a 4-point score. She made a total score of 80 points, giving her a mental age of 5 years 3 months.

## CHAPTER EIGHTEEN

### CORRECTING ERRONEOUS IMPRESSIONS OF MENTAL ABILITY

#### ERRONEOUS IMPRESSIONS OF INFERIORITY

THE appearance and behavior of certain children lead their observers to judge them as inferior mentally. While this judgment is more likely to be true than false in cases where the observer has a fair knowledge of children, it is not invariably true. The results are sometimes unfortunate for those children who appear to be more stupid than they really are. The cases described below indicate the rôle of mental tests in assisting adults who deal with such children.

*L. A.: girl, age 3 years 11 months.* The matron of the orphanage where L. A. lived brought in L. A. with the remark, "Not much force here. She doesn't talk much and seems quite backward." L. A. was a pathetic-looking child. Her eyes were deep-set and had dark hollows underneath; she was pale and thin, and her nose was running. She was extremely timid and bashful and sat in her seat at the examining table scarcely daring to touch the test materials until she was urged to do so. It was not long, however, before she had forgotten herself in eager handling of the "games."

L. A. proved to be far from stupid. She had very little to say, it is true, and her responses to the Action Agent Test were meager and lacking in variety. She made no spontaneous comments. She failed also to build the Little Pink Tower correctly. But she did the Mare and Foal Test in 60 seconds and the Seguin Form Board in 48 seconds, and built the six-cube pyramid in 16 seconds. She was dexterous in buttoning the button strips and unusually capable with the picture puzzles. Her score on the Merrill-Palmer scale was 70, giving her a mental age of 4 years 6 months and a percentile rank of 84.

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The matron was somewhat surprised at the results of the test, and, while a little inclined to doubt the findings, admitted that the child took care of herself pretty well and made no trouble. "But she certainly doesn't know how to talk," she concluded defensively.

*R. T. : boy, age 19 months at the time of first examination.* This child entered the Merrill-Palmer nursery school at the age of 19 months. At that time he was a somewhat flabby, moderately large child, with several indications of early rickets. His head was square, and he had knock-knee, bow-leg, and pronated feet. He was a calm, even-tempered child, and smiled a great deal. He spent a great deal of energy in learning to walk. He had had convulsions about two months before entering the nursery school. His tonsils were slightly enlarged. On the whole, he seemed to be slightly below average physically.

On the Merrill-Palmer scale R. T. had a mental age of 20 months at the age of 19 months. He proved to be cooperative when praised sufficiently. He was rather inattentive and worked best when speeded. He could say a few words and was so curious that he was not satisfied until he had seen the contents of every box in sight.

After he had been in the nursery school a few weeks, the nursery school teachers began to express doubts as to the reliability of the test results. R. T. drooled a great deal. He did not seem to understand even the simplest directions, did not work at anything long, and impressed the teachers as spending much of his time in wandering about. Often he sat staring dreamily into space and frequently showed little concern about what was going on around him. Judging from the teachers' difficulty in training him, he appeared to be much inferior to the other children. One teacher said, "You may have a satisfactory test score on that child, but he acts like a subnormal child, and mark my words, he will

probably test subnormal next time." Had it not been for the test results, this teacher would have recommended that the child be withdrawn from the school on the basis of his inferiority.

After six months R. T. was tested again. He was then 26 months old. This time he made a score of 21 points on the Merrill-Palmer test, giving him a mental age of 28 months and a percentile rank of 80.

At 3 years of age R. T. was making much the same impression on his nursery school teachers. He was given the Stanford Binet test and at this time appeared to be very talkative, rather tense, and excitable and flighty. He wanted to play with everything in the room, but when he was made to understand what was wanted of him he settled down nicely and coöperated well. On this test he made a mental-age score of 3 years 8 months — an IQ of 122.

Eight months later, when he was 3 years 8 months old, R. T. was given both the Merrill-Palmer and Stanford Binet tests again. On the Merrill-Palmer scale he made a score of 68, giving him a mental age of 4 years 4 months, which has a standard-deviation value of  $+1.0\sigma$ . On the Stanford Binet scale he made a mental-age score of 5 years 2 months — an IQ of 140. He was friendly during the examination, talking a great deal and asking many questions. He used baby talk and seemed to enjoy dependence upon adult help. He showed breadth of interests and associations during the test. He did not concentrate very well, however. In both tests he showed outstanding ability in language.

In the nursery school R. T. was still reported as tense, flighty, and babyish. He made bids for adult attention, sucked his thumb, and seemed to make no satisfactory adjustment to the children. There was also occasional enuresis. The drooling had ceased. Special effort was made to overcome some of R. T.'s dependence upon adults and his

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infantile emotional habits, and he seemed to improve slowly. Even at present, however, he does not seem to indicate in his daily contacts in the nursery school the very real ability he evidences in the mental-test situation.

*B. Mc.: boy, age 2 years 9 months.* This boy was referred for examination by a pediatrician; the general appearance of the child and his high-arched palate and habit of drooling had led the pediatrician to suspect feeble-mindedness.

B. Mc. was somewhat slender and pale, but on the whole seemed to be of fair size and well developed for his age. He was very coöperative, alert, and interested during the examination. He erred on the side of oversuggestibility, rather than on that of negative responses. He seemed eager to please and showed a fair degree of concentration on his work. He held his mouth open and drooled continually as he worked.

The child was really too young to take the Stanford Binet test, and the resulting mental age of 2 years 10 months — an IQ of 103 — cannot be considered accurate. He passed four tests of the 3-year group but failed to name his sex and to repeat six to seven syllables. He tried hard to repeat the syllables but said at least one word wrong in every sentence. In year four he passed the easy comprehension questions but failed all the other tests. He failed all the tests of year five. He almost passed the three-commissions test; but after the first two commands had been satisfactorily performed, he pointed to the box and said, "I bring the box, lady," but, though the examiner nodded and smiled, the child stood looking at the box a moment and then returned to the examiner without it. He answered two of the definitions in the year-five group correctly with the statements, "A horse is for running," and, "A pencil writes."

On the Merrill-Palmer series B. Mc. made a score of 24 points, giving him a mental age of 30 months. He failed the Seguin Form Board, though he placed correctly all the

forms but the star. This proved to be beyond his skill in both the two trials. His judgment of form seemed somewhat superior to his muscular coördination. He tried hard to cut with the scissors, but seemed to be unable to make his two hands work at separate phases of the task. He failed both on the one- and two-button tests and the Color-Matching Test. He put the pegs in the Wallin Peg Boards very quickly and assembled the Nest of Cubes in 19 seconds.

His performance in all the language tests except the repetition of word groups was average. He usually spoke in phrases, though occasionally he used sentences. "Dat go in dis boy," he said of the Seguin Form Board, and kept asking, "Where bwong, lady?" Whenever he was tired of a task and wanted to stop, he demanded, "Gimme my cubber [cover]." He often repeated such comments of the examiner as, "Put in," and, "Good work."

An interview with the mother indicated a satisfactory home atmosphere and wise treatment of the child on the whole. Certainly there was no outstanding mismanagement, as the child's behavior had indicated there might be.

The child seemed to be of average mental ability with no indication of brilliance but certainly with none of definite inferiority. There was no behavior problem. The mother was apparently eager to give the child the very best training she could. When she was told that the child was of average ability, she almost wept with relief.

*H. M.: boy, age 4 years 6 months.* Orphanages yield many children who are below average. Many of them are languid and dull and obviously inferior, though they usually respond eagerly to the individual attention accorded them in the test situation. H. M. appeared at first to be of this type. He was a stupid-looking child, with a heavy, expressionless face and somewhat awkward control of his body. He had also a decided lisp. The examiner settled down for



what promised to be a long siege with the child. The child first failed the Little Pink Tower. Then he did the Seguin Form Board in 47 seconds and the Mare and Foal Test in 88 seconds. The examiner then changed her mind: The dull-looking child was not so dull. His performance continued to be good and he earned a score of 75 points, giving him a mental-age score of 4 years 10 months.

#### ERRONEOUS IMPRESSIONS OF SUPERIORITY

It frequently happens also that the child gives an erroneous impression of superior mental ability, either because of his personal appearance or because of some special ability which leads the child's associates to overestimate his general ability. Even persons who have had considerable experience with children are subject to this error of judgment. The cases given below illustrate typical instances of this error.

*J. B. and J. S.* One morning two mothers, cousins and near neighbors, brought their two young sons, who were their only children, to be given mental tests. J. B.'s mother led him in with the obvious intention of showing him off. She was tremendously proud and sure of his ability. J. S.'s mother was not so aggressive in her attitude and not so sure about her son's ability. It was clear that there had been a friendly dispute over which boy was the brighter. There was a difference of five months in the ages of the two boys, and this difference made the mothers a little uncertain about their relative ability. The children were duly tested, with the following results.

J. B. was 4 years 4 months old at the time of the examination. His mother insisted upon escorting him to the examining room, where she drew the examiner aside and said that she knew quite well that her son was far brighter than the other child and that one glance at his alert little face would convince anyone that he was a bright child. She had brought

him, she said, not to find out whether or not he was bright; she knew that he was. But she wanted to prove that he was brighter than J. S. She then asked J. B. to recite some of the little poems he knew. J. B. attempted, self-consciously, to rise to the occasion. The examiner cut short this exhibition, however, and asked the mother to wait outside; she then proceeded to adjust the child to the test situation. This was a little difficult after the bad start he had had. He had an idea that there was a puzzle behind the simple questions asked. He tried to spell the words. When asked, "What is a chair?" he answered doubtfully, "A, B, D." He was sure that counting four pennies was an arduous task and went on counting long after he had reached the count of four. On the Stanford Binet test he made a mental-age score of 3 years 6 months — an IQ of 81. On the Merrill-Palmer scale he did not rate quite so low. His score of 60 points gave him a mental age of 3 years 11 months, with a percentile rank of 30. He was slow in comprehending what was wanted and finished each task with an air of great pride at having done so well.

It was difficult to tell the mother where her child stood in mental development, but it was essential that she understand clearly what her mistake had been and what harm it had done to her son. He was an average child, with no apparent special abilities, and it was necessary that the parents understand and face this fact so that they would avoid building up in the child a feeling of easy superiority which wider experience would fail to substantiate. He was rapidly gaining a feeling of exaggerated self-importance which would be likely to render less effective any work he could do.

J. S. was 4 years 9 months old at the time of the examination. He was rather shy and self-conscious at first but soon began talking freely and working with great interest. When doing the Mare and Foal Test, he said, "Two horsies in the same

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row, a baby horse and a big horse. Where's the chicken go? Will you show me? The chickie won't go in. That naughty little chicken won't go in the hole where it goes. Is this the hole where chickie goes?" He worked for a little longer and then began to pound the chicken, saying, "It's talking back to me. It doesn't go. Go on, lay down there." Many of his responses similarly revealed his facile imagination.

J. S. was friendly and open in his responses, but was a little clumsy and afraid of doing the wrong thing in motor tasks. In the tests requiring verbal comprehension and expression J. S. was above the average. He made a mental-age score of 6 years 0 months on the Stanford Binet scale — an IQ of 126. On the Merrill-Palmer scale he was not outstanding. His score was 69 points, giving him a mental age of 4 years 5 months, which has a percentile rank of 33 and a  $0\sigma$  standard-deviation value.

His mother was told of the discrepancy between his language development and his motor skills. She was urged to give the child stimulation and opportunity to do things for himself. She was eager to supply the child with a well-rounded development and received gratefully suggestions concerning play material which would tend to stimulate motor control and skill.

On the Merrill-Palmer scale there was no apparent difference between the boys. The Stanford Binet test did show a rather striking difference in favor of J. S. There is no question that this difference in language development was emphasized in J. B.'s disfavor by his self-conscious inhibitions, for he continually expected the task presented to have some solution other than the obvious one.

One year later these children were invited to return for a retest. J. S. was brought back by his mother, who showed great interest. At this time he was almost 6 years old. He

was too old for the Merrill-Palmer scale to be of value in determining his mental level. Accordingly, only the Stanford Binet test was given to him. His mental age was 6 years 8 months — an IQ of 116.

J. B.'s mother refused to bring him in for another examination, saying most emphatically that she did not believe in mental tests and would never ask J. B. to take another one.

*A. V.: girl.* A. V. entered the Merrill-Palmer nursery school at the age of 3 years 4 months. She was a tiny child, with an alert, almost elfin face. She smiled often, especially at adults, and talked with a high-pitched, babyish drawl, which suited her size better than it suited her age. Visitors to the school frequently pointed her out, with some such remark as, "Isn't she a cute youngster? I'll guess she is one of your brightest," or "It's no trouble to tell that she is a clever child." This was the judgment of all who did not know the child's age.

A. V. was first given the Merrill-Palmer test when she was 3 years 4 months old. Her score was 50 points, giving her a mental age of 3 years 4 months. She was neat and careful in her performance but found it very difficult to maintain the idea of the goal set for her for any length of time. She displayed marked curiosity, but she was slow, took no initiative, and tended to ask for help from the examiner.

On the Stanford Binet scale, which was given three months later, when she was 3 years 7 months old, she made a mental-age score of 3 years 4 months — an IQ of 93.

Retests were given at intervals of from seven to eight months. She was given the Merrill-Palmer test again when she was 4 years 0 months old. At this time she had been in regular attendance at the nursery school for eight months and had shown some gain in adjustment in the nursery school; this gain was reflected in her mental-test score,

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which was 71 points, giving her a mental age of 4 years 7 months and a percentile rank of 82. During the same period A. V. had gained two inches in height and her physical condition was much improved. She was still much below the expected height for a girl of 48 months. At this time she was reported as quick in her movements and energetic in her attack upon things but still lacking in the degree of motor coördination usual at her age.

The next autumn, after a summer out of school, A. V. was given the Stanford Binet test again. At this time she was 4 years 4 months old. Her mental age was 3 years 8 months — an IQ of 85. Again she was reported as showing poor concentration and not much initiative.

In one ability, however — skill in art — the child was gaining steadily and rapidly. She could cut attractive designs from paper and make lovely color combinations in painting. The child's parents were both artists, and she doubtless received much stimulation from them in these attainments; she may also have inherited a predilection for this type of occupation.

A. V. was given the Merrill-Palmer test again when she was 4 years 7 months old. At this time she made a score of 75 points, just 4 points more than she had made seven months before. Her mental-age score was 4 years 10 months, with a percentile rank of 65. She was reported as happy and loquacious; she liked adult attention and often asked for help. Occasionally she was stubborn and insisted upon having her own way. She used baby talk that was at times difficult to understand.

The erroneous opinion that this child was superior was held only by short-time observers. The nursery school teachers realized her mediocrity. In their opinion she was an attractive and likable child but not an able one.

## CHAPTER NINETEEN

### CONFIRMING GENERAL IMPRESSIONS OF MENTAL ABILITY

#### THE INFERIOR OR FEEBLE-MINDED CHILD

OCCASIONALLY, as some of the cases cited illustrate, persons who work with children are likely to make erroneous judgments concerning their ability, owing to the child's possession of some trait, or ability or disability, which tends to conceal the true mental level. In most instances, however, the general impression of mediocrity or inferiority is likely to be well grounded. The following case studies illustrate the development of the type of child whose mental ability has in general been sufficiently indicated by his behavior so that the general impression of his intelligence level has been fairly accurate.

*B. A. : boy, 7 years 10 months.* The father of this boy is a well-to-do business man, and his mother a cultured and attractive young woman. He is the only child. The child had been taken to one doctor after another because he was not developing properly. He had had rickets as an infant, and the first indications of defective mental development had been ascribed by the physician to rickets; he promised that the child would outgrow these deficiencies. As time went by, however, they became more marked. He was referred for a mental examination by a pediatrician.

The child was obviously abnormal, and the mother was unwilling to face the fact though she had been told several times that the child was defective. She still clung, almost fanatically, to the hope that he would outgrow his defects. The father was much better adjusted to the situation and was much more effective in handling the child than the mother was.

B. A. had been sent to private schools, but none of them could keep him. He had had a private tutor during several

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weeks preceding the examination. The tutor had found it very difficult to make any headway, though she thought she had seen some improvement. The child was learning to cut, to use a pencil, and to lace and unlace his shoes. The mother reported that he used to scratch, bite, pinch, and pull hair, but that he was getting over these habits. He was easily managed if handled rightly, but required much coaxing and encouragement. Occasionally he had violent outbursts of temper and tantrums. The tutor had told the mother that she thought the child subnormal, but to no avail; the mother would not hear of it.

The report from the pediatrician stated that he considered the case a simple one of congenital mental defect. The boy was in good nutritional condition, and there had been no sign of active rickets since the child had been 2 or 3 years old. The pediatrician asked that the level of development be ascertained and that the mother be told plainly just what she might expect of the child.

The examination showed B. A. to be markedly retarded. On the Stanford Binet scale he was able to do only the first three tests of year three, giving him a mental age of 2 years 6 months. On the Merrill-Palmer scale he achieved a mental-age score of 2 years 7 months. On the Merrill-Palmer test he showed a wide scattering of ability from the 18-month level to the 42-month level. He became fatigued easily and was able to attend to one task for only a very short time without shifting his attention. He seemed at times to have flashes of ability much better than his usual level of performance. He could not hold an objective in mind but had to be reminded constantly of his goal. His language development was superior to his bodily coördination. He answered eleven of the Action Agent questions correctly, yet could not button the one-button strip. He was able to answer all ten of the questions, but failed to match the colors

and to do the Nest of Cubes. He had a coarse tremor and gave evidence of spasticity of the muscles of his hands and arms. He could put some words together. When doing the Seguin Form Board, he frequently asked, "Where go?" When asked, "What blows?" he said, "Outside went way way off." He also asked, "Where car go to?"

B. A.'s mother was told what the child's level of development was and what his probable attainments would be. She was also given a detailed explanation of what she might expect of the child at his present stage of development and from what types of training he would profit most. An effort was made to show the mother that ultimately the child would need institutional care.

*T. H.: boy, age 5 years 6 months.* T. H. was a typical Mongolian idiot. His body was short and dumpy; he had short arms and thick, stubby fingers. His head was round. His eyes had an upward slant. His tongue was thick, often protruded, and had deep creases. His hair was coarse and straight. He could not talk, and he seemed to understand very little of what was said to him. His performances were like those of a child of 18 months. His score on the Merrill-Palmer scale was 3 points, giving him a mental age of 18 months.

The mother was an intelligent, kindly woman, who had had little education. She had already been told that her son was not a normal child, and she herself realized that at the age of  $5\frac{1}{2}$  years he was mentally less advanced than her baby of a little less than 2. She and her husband had spent a great deal of money and effort in trying to have something done for the child. She was advised that at the time there was no known cure for his affliction and that there would be no use in taking him to doctors, as she had been doing. She wished to keep the child in her home unless he became unmanageable, in which case she would



send him to an institution. Both parents were very fond of the child. The mother seemed to realize that it might be a handicap to the younger, normal children to have T. H. at home, but said she would do her best to see that his presence did not interfere with their development.

*J. F.:* boy, age 4 years 10 months. J. F. was the youngest son of a fine, stable family, with no history of mental disease or deficiency on either side. The child was referred to the Consultation Center by the family pediatrician. J. F. was sufficiently retarded to appear so on casual inspection. He drooled most of the time and had little control of the mouth muscles or of the muscles involved in walking and manual coordination. He had also a convergent squint of the left eye.

J. F. was cooperative in the examination, but somewhat inattentive. Unless the task had decided appeal for him, it was necessary to bring his attention back to it again and again. He brought a toy into the examining room and frequently went back to it between tests; he seemed never to forget it entirely but was easily distracted from it by any object presented by the examiner. The child's level of ability was low. There was a slight scatter in the tests. His most pronounced success was with the two-piece puzzle, which he put together in 6 seconds. His worst failures were on the tasks involving the coordination of the two hands — cutting with scissors and buttoning. He could not do the Seguin Form Board. He did not enunciate very clearly. For "That's my shoe," he said, "Da my tue." His language development seemed to be about that of the average child of 2½ years. His total score on the test was 28 points, giving him a mental age of 2 years 7 months.

He thus proved to be decidedly retarded. While he was inclined to be active, inattentive, and restless, he was also easily distractible and suggestible, which made controlling

him less difficult than it would otherwise have been. It seemed unwise to suggest to the child's mother any other solution than that of ultimate institutional care.

#### THE AVERAGE CHILD

By far the largest number of children who are brought to mental-testing clinics prove to be of average ability. The following case studies are presented simply as illustrations of this level of development.

*V. S.: boy, age 4 years 8 months.* This boy was referred for examination by the matron of an orphanage. His mother was a French Canadian and his father a German. He was a silent, unresponsive child while in the orphanage, and the matron believed him to be mediocre, or possibly inferior, in mental ability.

The interest and excitement of the examination stimulated V. S. to speak a little. He spoke indistinctly, mouthing his words, and the rapidity of his speech made it even more difficult to be sure that one understood what he was trying to say. For this reason no rating could be obtained on the Stanford Binet test. V. S. was a retiring child, obviously repressed and lacking confidence in his own ability, yet at the same time showing little ability to criticize his own performance. While doing the Merrill-Palmer test, he pushed the pieces of the Manikin together with no understanding of their relation and smiled happily, obviously with pleasure at having done the task correctly. This performance was not outstandingly below the level for his age. He reduced his time and errors on the Seguin Form Board from 137 seconds and 9 errors on the first trial to 48 seconds and no errors on the second trial. He showed superior speed on the button strips. His total score on the Merrill-Palmer test was 62, giving him a mental age of 4 years 0 months when the language tests were counted; with the Action Agent

Test and the Decroly Matching Game omitted in consideration of the child's apparent language handicap, his score was 65, with a mental age of 4 years 2 months. The matron was advised that she had been justified in considering the child of mediocre ability.

*F. E.*: girl, age 2 years 7 months. When *F. E.*, who was illegitimate, was 2 years 2 months old, her mother decided that she could not keep the child any longer. Physically *F. E.* was in bad condition when she was accepted for boarding care. She was anæmic, had little appetite, and had been given little to eat besides milk. She had had very little care and training. She was accustomed to gain attention by temper tantrums. She was extremely jealous of other children, going into a fit of rage if they came near her.

The boarding home was a good one, and the child improved rapidly. She continued to have temper tantrums for about four months, when they gradually disappeared. She gained steadily in weight and improved in general physical condition as she learned to eat foods other than milk.

When *F. E.* was 2 years 7 months old, she was brought to the clinic for a mental examination. She came to the examining room willingly, taking the examiner's hand in a friendly fashion. It was difficult to keep her on her chair; she pushed it about, played with it, climbed over every chair in the room, and wanted to open every drawer and box she saw. She showed good motor coördination in her handling of these materials. She was so much interested in the test boxes that it was difficult to persuade her to finish the task she had attempted. She was not contented to play with one thing for more than a short time. She was willing to play as long as she could keep opening boxes; it did not matter whether or not she had opened them before. She almost refused to go downstairs at the end of the examination, because she wanted to play some more. When the social worker who had

brought her tried to put her wraps on, she protested, saying, "No, not yet."

Her interest, however, was not of the type to help her keep an objective in mind, and she had to be continually reminded of the goal. She was so impulsive that it was difficult to persuade her to listen to directions; she seized the test materials before the directions were given, and soon tired of the game. She was interested, alert, and very quick in her motor responses, but lacked concentration and perseverance. On the Merrill-Palmer scale F. E. made a score of 20, giving her a mental age of 2 years 4 months.

It was evident that F. E. had average mental ability. Her mental age was three months lower than her chronological age, but the personality and behavior difficulties encountered during the examination made it clear that the score probably underestimated her ability. The problem of this child seemed to resolve itself into a need for habit and personality training. She had shown remarkable improvement during the five months of boarding care preceding the examination, and it was suggested to the child-placing agency that continued care in a calm, well-regulated home environment would be of great benefit to her. It was recommended also that she be given blocks and other simple constructive toys and be encouraged to work with them uninterruptedly. Association with children of her own age was considered a necessity for F. E. It seemed reasonable to suppose that F. E. might prove a satisfactory risk for adoption; but it was recommended that she be returned for another examination a year later before she was placed permanently.

At the suggested time F. E. was returned for another test. She was then an attractive child, with a facile use of language for her age, and alert and interested. She showed a tendency to play for attention. Her physical condition seemed to be good. She was happy and trustful. On the Merrill-Palmer

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scale she made a score of 60 points, giving her a mental age of 3 years 11 months, which was the same as her chronological age.

*B. B.:* boy, entered the Merrill-Palmer nursery school at the age of 21 months. B. B. was an active child, but restless and spasmodic in his activity. Out of doors he was inclined to do a good deal of purposeless running about and shouting. Indoors he did not readily settle down to work or play. He was vigorous, but neither steady nor constructive. Physically, he was fairly robust, with no outstanding defects. He was usually happy and contented, but cried easily when he was hurt and was upset when the children teased him. He laughed and talked when pleased. He showed little affection for either his parents or other adults or children. He was coöperative and very suggestible. He became self-conscious if selected to do something alone among the children and tended to become self-deprecatory at such times. He loved to play with other children and was dependent upon them to initiate games and to lead, but joined them happily and was not quarrelsome. He had a sense of fair play and justice in his relations with other children.

B. B. was given a number of tests during his stay in the nursery school. They placed him fairly consistently in the average group of attainment. The results of these tests were as follows:

Age 1 year 9 months. Score on the Merrill-Palmer test, 11, giving him a mental age of 1 year 11 months and a percentile rank of 70. At this time the test situation was so strange to B. B. and he seemed to have so much difficulty in adjusting himself to it that the examiner could not be sure that the result was accurate. He refused to attempt five of the tests presented. For this reason another test was given to him two months later.

Age 1 year 11 months. Score on the Merrill-Palmer scale, 17 points, giving him a mental age of 2 years 2 months and a percentile rank of 88.

Age 2 years 7 months. Score on the Merrill-Palmer scale, 27 points, giving him a mental age of 2 years 7 months and a percentile rank of 47.

Age 2 years 9 months. Score on the Merrill-Palmer scale, 31 points, giving him a mental age of 2 years 8 months and a percentile rank of 45. B. B. was given a demonstration test before several observers at this time. It was expected that the result would be distorted because of this audience and that the score would have little significance in interpreting the child's mental level.

Age 3 years 3 months. Mental-age score on the Stanford Binet scale, 3 years 4 months — an IQ of 102.

Age 3 years 4 months. Score on the Merrill-Palmer scale, 47 points, giving him a mental age of 3 years 3 months and a percentile rank of 40.

Age 3 years 8 months. Score on the Goodenough Drawing a Man Test, 0.

Age 3 years 10 months. Mental-age score on the Stanford Binet scale, 4 years 6 months — an IQ of 117. Score on the Goodenough Drawing a Man Test, 0.

Age 4 years 4 months. Mental-age score on the Stanford Binet scale, 4 years 6 months — an IQ of 104. Score on the Merrill-Palmer scale, 66 points, giving him a mental age of 4 years 3 months and a percentile rank of 48.

Age 4 years 7 months. Score on the Goodenough Drawing a Man Test, 0.

B. B. was withdrawn from the nursery school at the age of 4 years 8 months and so far has been given no follow-up tests.

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The only tests in the series which gave B. B. a rating even slightly above average were the Merrill-Palmer test at the age of 1 year 11 months, when he had a percentile rank of 83, and the Stanford Binet test at 3 years 10 months, which gave him a mental age of 4 years 6 months. In view of the consistency of his average rating in the other tests, these two probably overestimated his ability.

### THE SUPERIOR CHILD

Every psychologist who has had much experience in giving mental examinations knows the thrill of testing a bright child. It is usually easy to test such children. They are responsive and eager, and rapport is readily established. The examiner needs especially to watch for indications of personality weaknesses likely to handicap the maximum development of the child.

*J. B.: girl, age 3 years 1 month.* When this large, well-developed, really beautiful little girl was brought in, it was difficult to believe that she was only 3 years 1 month old. She was independent and self-reliant to a marked degree. "I can go upstairs by myself. My mother doesn't need to come with me," she said, as she started up to the examining room. She was fascinated by the tests and responded quickly and alertly to all the tasks presented, asking to repeat them after she had done them once. The first intimation of her marked superiority was gained from the speed with which she did the picture puzzles. She had Puzzle No. 2 together in 9 seconds and did No. 3 in only 15 seconds. She did the Decroly Matching Game in 182 seconds, making 2 errors. When the Manikin was presented, she said, "This is something new to me. I don't know how to put it together. Let me see if I can puzzle this out." She succeeded, with only one reversal. She was least successful with the buttoning tests and the peg boards, with which she was relatively

slow. Her total score on the Merrill-Palmer test was 73 points, giving her a mental age of 4 years 8 months, a percentile rank of 99 +, and a standard deviation of  $+2.5\sigma$ .

On the Stanford Binet test she made a mental-age score of 5 years 0 months — an IQ of 162.

The examiner was greatly pleased with this performance and went to inform the mother. To the examiner's surprise, the mother was unhappy and unenthusiastic. "I do not wish her to be precocious and superior," she said. She had been warned by physicians about the dangers of pressure upon bright children and the necessity of guarding their health. The child was so clearly superior that the mother and her friends were all conscious of the fact. The task of the psychologist in this case was to give the mother a better point of view about the care and training of superior children, to help her overcome some of her ungrounded fears, and to give her an understanding of her responsibility and opportunities with so promising a child.

At the age of 5 years 3 months J. B. was tested again. At this time the Merrill-Palmer scale was too easy for her, and she was given only the Stanford Binet test. She made a mental-age score of 8 years 1 month — an IQ of 154.

From the beginning J. B.'s manner indicated precocity and consciousness of it. At the first test she spelled her full name and gave her birth date. Despite her mental acceleration, she was very much a child in appearance, with her large blue eyes and light bobbed hair. Her remarks were indicative of her response to the test situation: "All these questions are easy for me," or, "I suppose most of the children you have aren't as smart as I am. I have brains in my head." As the test progressed, she said at intervals, "I have nearly everything you ask me correct." She did not have the "smart" attitude that frequently accompanies such a remark, but simply a quiet self-assurance that probably nothing could uproot. Her



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intelligent mind had taken full cognizance of its own superiority and had noted that comparisons with other children were always in her favor. Failure on the upper levels caused no chagrin, because she recognized that she was being questioned beyond any expected ability. There were few incorrect answers. She was sufficiently self-critical to evaluate her own responses and preferred "I don't know" to an inaccurate statement. She analyzed every step, as she proceeded, with amazing clarity. Her maturity and quality of ideation were almost uncanny in a child of 5 years; she conversed at practically an adolescent level.

J. B. had not yet been placed in school. It was becoming very difficult to keep her busy and out of mischief. She far outclassed the other preschool children in the neighborhood, with whom she might have played. The mother was advised to place her daughter in school at once.

*L. V. : girl, age 2 years 10 months.* An older cousin brought this bright-eyed child to the public school for a mental test, because he thought she was so bright. The school was located in a region of rooming houses and small, crowded apartments. Foreign-born and Negro families were predominant. The child was of Dutch descent, but neither the child nor her cousin spoke with an accent.

L. V. was very small and shy, and entered the examining room quietly, but eagerly. She found no difficulty, however, in forgetting herself in the tasks set before her. She was so tiny that she found it difficult to get at the more complex test materials; while working with the Seguin Form Board she crawled up on top of the table and rearranged the materials so that she could reach them more readily. The examiner, who had built up an idea of what to expect from children of  $2\frac{1}{2}$  years, was amazed at the child's responses. She made no errors on the Seguin Form Board; her best trial was achieved in 52 seconds. She did the Mare and Foal

Test with 6 errors in 85 seconds. Her other performances were equally good. She made a score of 12 on the Action Agent Test and 3 points on the Manikin Test. Her self-confidence and poise in handling the material were pleasant to watch. Her total point score was 70, giving her a mental age of 4 years 6 months, with the very rare standard-deviation value of  $+3.5\sigma$ .

Unfortunately, it was impossible to locate L. V. later for another test. It was assumed that she had moved out of the city, since the public school was unable to trace her.

*E. M.: boy.* E. M. entered the Merrill-Palmer nursery school at the age of 1 year 11 months. He was first given the Merrill-Palmer test one month before his admission to the nursery school, at the age of 1 year 10 months. His score was 16, giving him a mental-age score of 2 years 2 months, and a percentile rank of 87. He was a chubby youngster, very active, and interested in everything. He was delighted with the tests calling for manipulation but refused most of those which were essentially language tests. He repeated single words but would not repeat word groups. The examiner believed that he was unable, rather than unwilling, to repeat the word groups, but scored the tests as refusals.

E. M.'s performance on the Wallin Peg Boards and similar material was at a 3-year level. He was able to complete the first two trials of the Seguin Form Board but became fatigued and did not finish the third trial. At this time it was suggested that E. M.'s motor coördination was superior to that of most children of his age, but that in language ability he seemed slightly below average.

E. M. was outstanding in the nursery school from the beginning. He adjusted well to the other children, readily assumed responsibility, and took pride in doing things for himself. His chief difficulty was expressing himself verbally; for over a year he had a marked stammer.

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E. M. was given the Merrill-Palmer test again at 2 years 7 months of age, nine months after the first one was given. At this time his total score was 59 points, giving him a mental age of 3 years 10 months and a percentile rank of 99. The examiner reported that nothing was too hard for the child to attempt. He rarely asked for help, and he worked with a persistence that was remarkable in so young a child. He was so absorbed in what he was doing that he seemed oblivious to what was going on around him. He learned names quickly; he asked the names of all the Seguin Form Board pieces and afterward used them in speaking of the pieces. He stammered quite badly at times, especially when he was excited about what he was doing. On the Action Agent Test he answered 13 of the 20 questions correctly.

E. M. was first given the Stanford Binet test when he was exactly 3 years old. He made a mental-age score of 4 years 6 months — an IQ of 150. His failures at the younger age levels were in the comparison of lines, copying a square, repetition of four digits, naming colors, and æsthetic comparison.

The third Merrill-Palmer test was given at the same time as the second Stanford Binet test, when E. M. was 3 years 7 months old. On the Merrill-Palmer scale he made a score of 77, giving him a mental age of 5 years 0 months and a percentile rank of 99. On the Stanford Binet scale he had a mental age of 5 years 4 months — an IQ of 149. The examiner's report was not so favorable as previous ones. At times E. M. was stubborn and irritable, and even sulky; he showed a marked independence, but also a tendency to let someone else do the task for him. He did not like failure, but gave the impression of not doing his best. He had a fine control of language and continually asked questions. He showed a marked freedom in his work, marked breadth of associations, and many imaginative tendencies.

E. M. was given the tests again at the age of 4 years 1 month. On the Stanford Binet scale he made a mental-age score of 6 years 4 months — an IQ of 155. On the Merrill-Palmer scale his mental age was 6 years 2 months, with a percentile rank of 99. He was self-confident, loquacious, and amiable, and seemed very wholesome and unspoiled. When a task proved to be too difficult for him, he accepted his failure in a matter-of-fact way and said, "I can't." He was independent and inclined to follow out his interest regardless of outside influences. He asked many sensible questions. He talked in long sentences, distinctly and clearly, with no hint of the stammer previously observed. He answered all but one of the Action Agent questions. He was highly imaginative, and everything was of interest to him. He had a good sense of humor. He was busy every minute, quickly grasped the situation presented to him, and then made a serious, businesslike attack, which was sometimes interrupted by his sparkling imagination.

In the nursery school E. M. occupied himself with constructive tasks. He made wooden boats of quite respectable appearance at the work bench. He had an abstract understanding quite remarkable in a child of his age. The other children respected and liked him. He seemed to have little difficulty in making social adjustments but was more interested in constructive manipulation of materials than in playing with other children. Among the children who have attended the Merrill-Palmer nursery school he was one of the most promising.

## CHAPTER TWENTY

### CASES SHOWING INCONSISTENT RESULTS ON THE STANFORD BINET AND MERRILL-PALMER SCALES

UNLESS children are suffering from some special disability or from a language handicap, their scores on the Stanford Binet and Merrill-Palmer scales usually show a fairly close correspondence. Occasionally there is a startling discrepancy in the scores on the two tests. The following cases illustrate such discrepancies.

*K. B. : boy, age 4 years 2 months.* K. B., an active, high-strung boy, was brought to the Consultation Center by his mother, who said that he was becoming difficult to manage. He was destructive and antagonistic, and tried out each adult he encountered to see just how far he could go with him. He appeared to be bright and was a thoroughly likable youngster.

K. B.'s mood was constant during the examination and conducive to favorable test results; he sometimes became impatient, but usually in a good-natured way, and for the most part was lively, talkative, and affectionate. Only once did he become angry, and that was when he was trying to button the four-button strip; he threw the strip down, but picked it up again, rather shamefacedly, when the examiner made no comment. He did not seem unduly self-conscious at any time. When asked to make a model like the examiner's, he said, "No, I'll make one like I want to," which he proceeded to do. He was proud of his new shoes and several times remarked, "Look at them — my new shoes." Occasionally the examiner found that challenging him brought out his best effort, as when she said, playfully, "I'll bet you can't." He countered, "You just watch me. I can too. I can make one just as good as yours." He was so confident of his own ability that praise was avoided, as causing undue elation.

It was found to be disastrous to persist in demanding a response when he had refused a task. He invariably met the request with an emphatic "I said I didn't know," and then kicked the table violently, with a subtle smile and a look of expectant inquiry at the examiner, who transferred her writing materials to her lap, with no comment. He then stopped kicking long enough to say, "I can break a table apart with a hammer." When asked if his mother liked to have him do so, he said with a smile, "I do it anyway . . . then she breaks me." In the satisfaction surrounding this memory, he lost sight of his kicking activity and did not resume it.

The outstanding personality traits revealed by the examination were a spirit of independence and vindictiveness and a quick temper. In the field of intellectual traits the following stood out: power of observation, wealth of imagination, ingenuity, keen and rapid perceptions, and ease of logical deduction.

On the Stanford Binet test K. B. made a mental-age score of 4 years 4 months — an IQ of 104. K. B. did not place a maximum of effort on the test, and the results probably underrate his ability. He refused or gave only half-hearted response to the items requiring repetition of syllables or digits. Four pennies he counted as "80," and was much impressed with the size of the number he knew. He did not know colors and could not do the patience test in year five. Right and left were indicated unerringly and represented the only test passed above year five.

On the Merrill-Palmer test K. B. made a score of 81, giving him a mental age of 5 years 6 months and a percentile rank of 96. K. B. made a different kind of response to the more objective material of this scale. As compared with his more or less spasmodic efforts on the Stanford Binet test, his performance on the Merrill-Palmer test, with the excep-

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tion of his outburst when doing the four-button strip, was superior and consistent. His interest and absorption were unusual for a child of the hyperkinetic type, to which his behavior at home and during the examination would seem to indicate he belonged.

The extreme difference between the two scores can be explained in part on the basis of K. B.'s impatience with and lack of interest in verbal material. The discrepancy probably represents a real difference in his abilities, as measured by the different materials of the two scales.

A careful program of treatment was worked out. The mother was informed of the need for lack of tension in the child's life and of the importance of avoiding antagonizing him and making unnecessary demands on him in the relationship of the boy and the adults in the home. It was recommended that the afternoon nap be reestablished.

*M. G. : boy, entered Merrill-Palmer nursery school at the age of 2 years 4 months.* M. G. was pale and rather thin, with poor posture, pronated feet, and definite evidence of previous rickets. He was a gentle, quiet child, lacking in vigor. He was timid and had many fears. He was rather awkward for a child of his age. He was independent, preferring to do all he could for himself without assistance. He tended to watch the other children playing in group activities, and seldom took an active part himself. He was sensitive to approval and disliked disturbances. He preferred giving his tricycle to another child to having an altercation about it.

M. G. was first given the Merrill-Palmer test when he was 2 years 4 months old. He made a score of 21 points, giving him a mental age of 2 years 4 months and a percentile rank of 60. During the test he said nothing spontaneously. Though he was quiet and reticent, he responded particularly well to the language tests. He answered 7 of the 10

questions and repeated correctly all the words and word groups.

At the age of 3 years 1 month M. G. was given both the Stanford Binet and Merrill-Palmer tests. On the Merrill-Palmer test he made a score of 47 points, giving him a mental age of 3 years 3 months and a percentile rank of 67. On the Stanford Binet scale he made a mental-age score of 4 years 8 months — an IQ of 151. At this time the examiner reported that M. G. played with everything that attracted his attention. He was absorbed in most of the work and was scarcely conscious of the examiner's presence. He used the blocks as a garage for an imaginary automobile, saying, "Look at the great big garage." Only his eyes betrayed his eagerness. He did not reach for material or assist in putting it away. He was characteristically passive in his attitude. To the casual observer in the nursery school, M. G.'s rating on the Stanford Binet test was a surprise. It was only in the mental-test situation that his wealth of associations and unusual richness of ideation for his age became apparent. He was much more interested in verbal material than in the manipulation of objects.

At the age of 3 years 11 months M. G. was given the Merrill-Palmer test for the third time and was retested with the Stanford Binet scale. At this time he made a score of 65 points on the Merrill-Palmer scale, giving him a mental age of 4 years 2 months and a percentile rank of 70. On the Stanford Binet scale he made a mental-age score of 6 years — an IQ of 153. He talked a great deal and seemed interested and alert to all the material but continued to show a marked preference for the verbal tests. There was a decided scatter in the results, showing an uneven development. His response to tests involving motor control was poor in comparison with that to tests involving memory, association, and comprehension of language.



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Seven months later, at the age of 4 years 6 months, M. G. made a mental-age score of 6 years 4 months — an IQ of 140 — on the Stanford Binet scale. In the interval he had been ill much of the time with tonsillitis and influenza, and seemed at the time of the examination to be even quieter and less vigorous than before. He was still pale and thin. On the Merrill-Palmer test, at the age of 4 years 7 months, he made a score of 82, giving him a mental age of 5 years 9 months and a percentile rank of 88. He was self-reliant and never asked for assistance. He seemed interested and happy and talked a good deal, as usual.

On the other mental tests given to M. G. while he was in attendance at the nursery school he made the following scores : Cole-Vincent Group Intelligence Test for School Entrants, at the age of 4 years 8 months, a score of 21 points, giving him a mental age of 6 years 3 months ; Dearborn Group Tests A and B, for Grades I to III, at the age of 4 years 8 months, a score of 28 points, giving him a mental age of 6 years 7 months ; Goodenough Drawing a Man Test, at the age of 4 years 8 months, a mental age of 4 years 9 months ; Pintner-Cunningham Primary Mental Test, at the age of 4 years 8 months, a mental-age score of 6 years 2 months.

As M. G. grew older, the nursery school staff attempted to round out his skills so that his development would be more even. He was encouraged to paint, cut, saw, and do all types of bodily activity. It is possible that this training accounts for the fact that the last test scores showed less difference between his performances on the Merrill-Palmer and Stanford Binet tests. Even at the time he left the nursery school, however, the records indicate that observers still considered him awkward and clumsy as compared with other children of his age.

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